Rock Products

Vol. XXIII, No. 16 July 31, 1920

Circulation 5300 copies, net

Applicant for membership in Audit Bureau of Circulations

Second class entry at U. S. Post Office

Table of Contents

FEATURE ARTICLES

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Old type of kiln with continuous firing and other modern features; economy of operation and other factors influencing selection of this type of kiln.

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Continuation of series of articles—Nitrogen, air and cyanamid.

Industrial Democracy 38
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DEPARTMENTS

Hints and Helps for the Plant Superintendent.. 20, 21
Sluing a caterpillar mounted drag-line; Safety device for large bucket elevators; Easily made bag holder; Special drills for broken quarry ledge.

Editorials 39
The open-top car situation.

Accident Prevention 40
Accident records; Serious blasting accident.

General News of the Rock Products Industries 41, 42, 43
Building industries mark time while coal moves; Sutton's advice on how to secure cars, etc.; Louisville Cement Co. moves cement to Louisville by electric cars.

General News of the Rock Product Markets.... 44
New York situation, etc.

New Machinery and Equipment..... 45
Device for increasing capacity of Raymond mills; Electric shovel operating data.

Current Prices of Rock Products..... 46, 47, 48
Prices f. o. b. plant of crushed stone, sand and gravel, agricultural limestone, lime, silica sand, gypsum and phosphate.

Passed by the Screens..... 49
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Nathan C. Rockwood.....Editor
Chas. A. Breskin.....Assistant Editor
Chas. H. Fuller.....Manager

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CHICAGO, ILLINOIS

W. D. CALLENDER, Pres. T. J. SULLIVAN, Vice-Pres.
GEO. P. MILLER, Treas. C. H. FULLER, Secy.

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INDEX TO ADVERTISEMENTS

Aero Pulverizer Co. 64
Allis Chalmers Mfg. Co. 72
American Crane & Eng. Co. 54
American Hoist & Derrick Co. 11
American Manganese Steel Co. 66
American Process Co. Inside front cover
American Well Works 60
Arnold & Weigel 58

Bacon, Earle C., Inc. 54
Baldwin Locomotive Works 1
Ball Engine Co. 61
Bates Valve Bag Co. 58
Beaumont Mfg. Co. 65
Browning & Co., Victor R. 66
Browning Co., The 15
Buchanan Co., C. G. Front cover
Buckbee Co., J. C. 55
Byers Machine Co., John F. 67

Caldwell, H. W. & Sons Co. 62
Central Switch & Frog Co. 54
Chapman Engineering Co. 65
Chicago Perforating Co. 54
Classified Advertising 53
Classified Business Directory 70
Cleveland Wire Cloth Co. 54
Columbus McKinnon Chain Co. 56
Crescent Belt Fastener Co. 55
Cross Engineering Co. 59

Easton Car & Const. Co. 72
Ehrsam, J. B., & Sons Mfg. Co. 55
Equipment Corp. of America 51
Erie Steam Shovel Co. 61

Fate-Root-Heath Co. 12
Fuller-Lehigh Co. 57

Gifford-Wood Co. 56
Grasselli Chemical Co. 9
Green, L. P. 56
Gruendler Pat. Crusher & Pulv. Co. Inside front cover

Hatch, James N. 55
Hendrick Mfg. Co. 62
Hettrick Mfg. Co. 61
Hunt & Co., Robt. W. 55

Jaite Co., The Inside front cover
Jeffrey Mfg. Co. 7
Johnston & Chapman Co. 58

K.-B. Pulverizer Co., Inc. 57
Kennedy-Van Saun Mfg. & Eng. Corp. 58
Kleinhans Co., H. 50
Koppel Industrial Car & Equip. Co. 64
Kritzer Co., The 57

Leschen, A., & Sons Inside back cover
Lewistown Fdy. & Mach. Co. Inside back cover
Lima Locomotive Co. 67
Link Belt Co. 16

Marion Steam Shovel Co. 4
Massey Co., Geo. B. 55
McAuliffe, Pierce J. 50
McMyler Interstate Co. 59
Miscampbell, H. 69
Morris Machine Works 68

National Engineering Co. 59
N. J. Wire Cloth Co. 54
Nortmann-Duffke Co. 54

Ohio Locomotive Crane Co. 60
Owen Bucket Co. 68

Pennsylvania Crusher Co. Inside front cover
Porter Co., H. K. 54

Raymond Bros. Impact Pulv. Co. 63
Ruggles Coles Eng. Co. Inside front cover

Sanderson Cyclone Drill Co. 61
Sauerman Bros. Co. 61
Schaffer Eng. & Equip. Co., The 63
Smith Engineering Works 14
Steacy-Schmidt Mfg. Co. Inside front cover
Stephens-Adamson Mfg. Co. 71
Stevenson Co., The 8
Stimpson Equip. Co. 6
Sturtevant Mill Co. 13

Terry Mfg. Co. 56
Traylor Engineering & Mfg. Co. 71

Universal Crusher Co. 57
Universal Road Mach. Co. Inside back cover
Used Equipment 50-51-52-53

Valve Bag Co. of America Back cover
Vulcan Iron Works 10

Waterbury Co. 62
Watt Mining Car Wheel Co., The 60
Webb City & Carterville Foundry & Machine Co. 60
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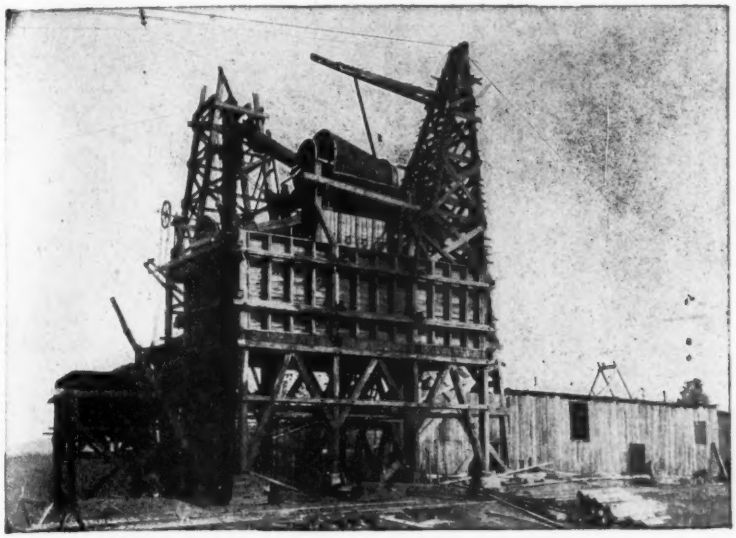

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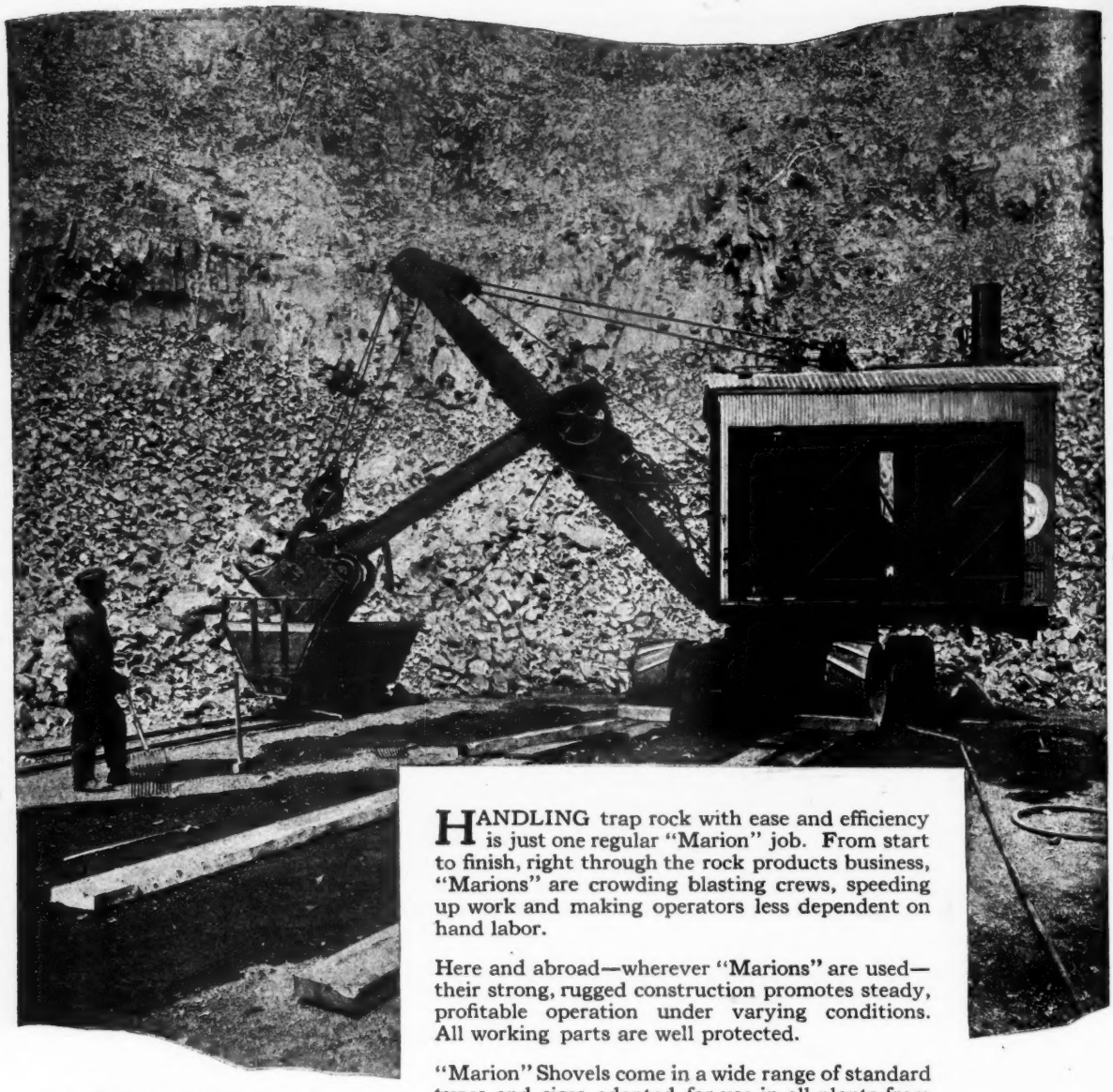

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"Marion" Shovels come in a wide range of standard types and sizes adapted for use in all plants from the very large to the very small. And our policy of concentrated production assures every "Marion" customer quicker deliveries than formerly.

Our thirty-six years of sound, successful, shovel-making experience is free for you to draw upon. We're always glad to furnish recommendations and estimates—write us today all about *your* problem.

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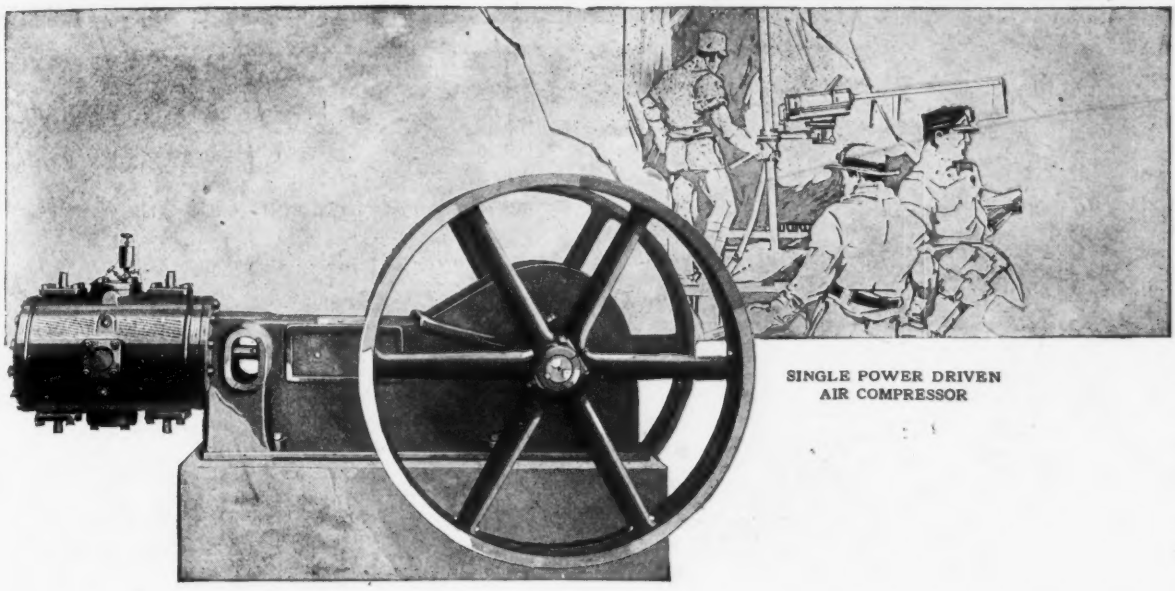

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AIR COMPRESSOR

What "FEATHER" Valve

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"FEATHER" Valve means first: COMPRESSION. It means compression that is sure, safe and always on tap. It means also, Worthington apparatus — the sort that is standard the world over, on land or sea.

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Worthington "FEATHER" Valve compressors are worthy workmates with the widely known Worthington pumps and pumping machinery—world's standard since 1840.

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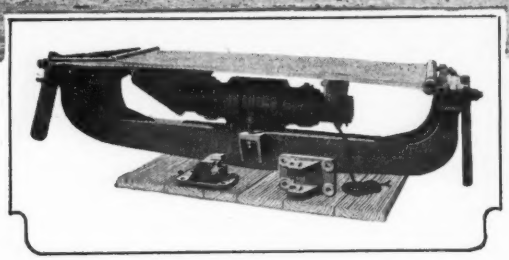

Plant of Utah Salduro Company, manufacturers of salt and potash, using three Mitchell Electric Vibrating Screens.

ELECTRIC VIBRATING SCREEN

United States and foreign patents applied for.

AS another proof of the versatility of the Mitchell Screen—its adaptability to a big variety of industries—comes the report from the Utah-Salduro Company, of Salduro, Utah, potash and salt refiners, and a subsidiary of the great Solvay Company of Syracuse, N. Y. This concern has installed three Mitchell Screens, and the general manager says—

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You will find the Mitchell Electric Vibrating Screen a most interesting piece of mechanism, and one that will readily solve your screening problems. Write us for a complete description.

See our exhibit at the Sixth National Exposition of Chemical Industries at the Grand Central Palace, New York, Week of September 20th

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MINING, MILLING AND SMELTING MACHINERY

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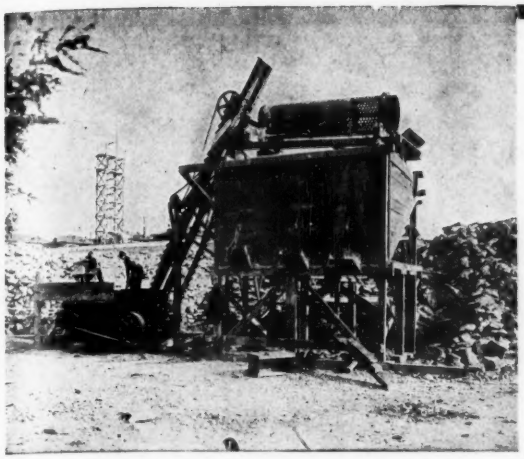
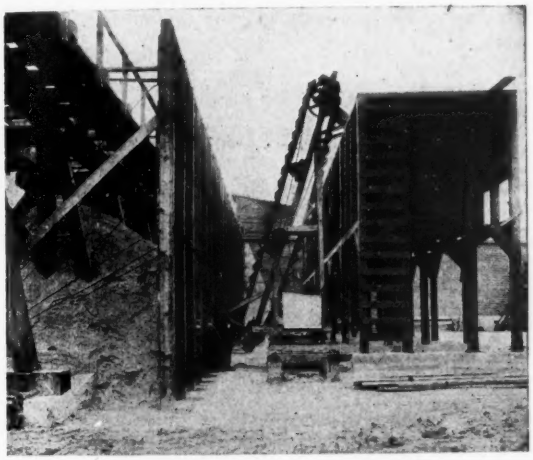
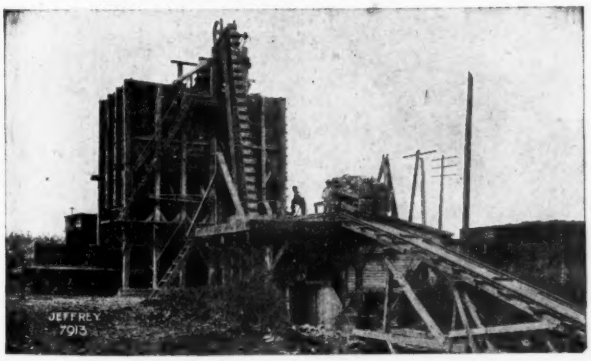


Road building outfit showing Jeffrey Continuous Bucket Elevator, which carries stone from crusher to revolving screen

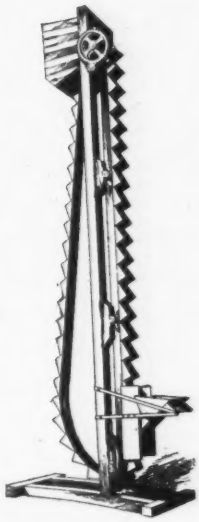


Portable outfit for loading bins from ground storage, showing Jeffrey Continuous Bucket mounted on a four-wheel traveling truck



Another "Good Roads" Limestone Crushing outfit showing Jeffrey Elevator from beneath large gyratory crusher to revolving screen over bins

USE Jeffrey Standard Bucket Elevators



Save the Time, Labor and Expense of making layouts and drawings by specifying one of the 52 standard elevators given in the Jeffrey Catalog No. 244E on Standard Bucket Elevators. Simply select the number and feet centers, and the information as to price and feet centers will be wired back at once.

We are manufacturing these Standard Elevators in stock lots—think what that means in the way of prompt shipment and low cost.

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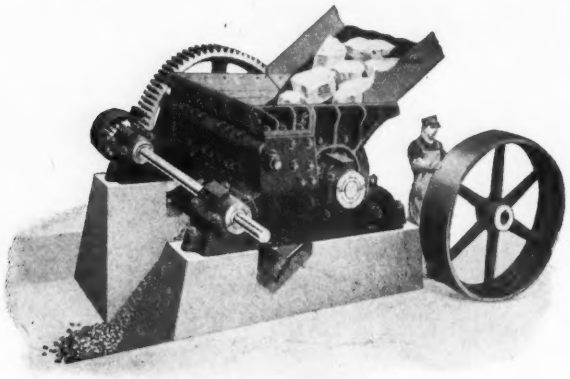

SINGLE ROLL CRUSHER
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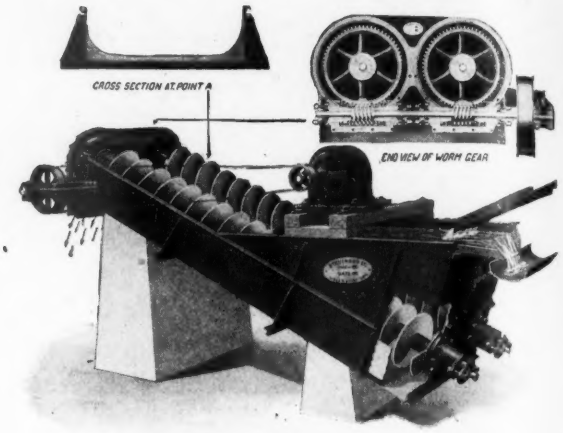

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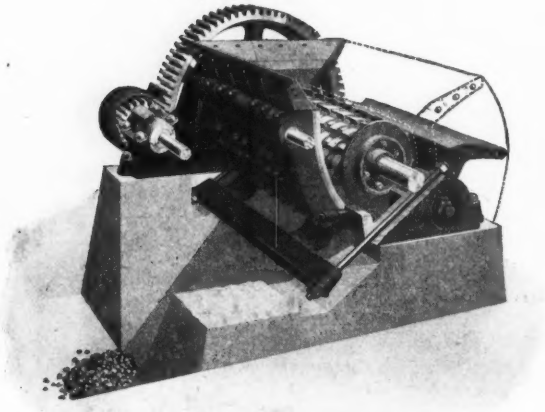

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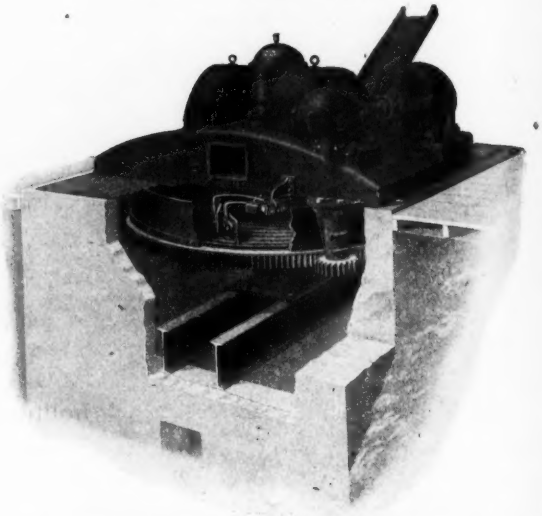
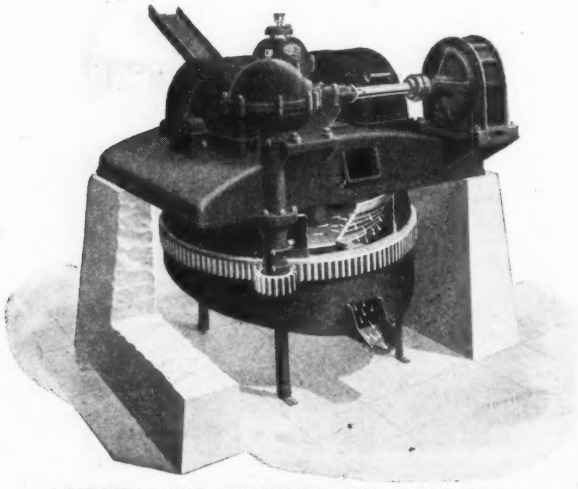


DRY AND SEMI-DRY GRINDING MACHINES, Model A30
Write for Bulletin No. 50



GRINDING AND WASHING PAN, Model A302
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Machines for
Crushing
Grinding
Pulverizing
Empounding
Tempering
Mixing and for
Elevating and Conveying all kinds of materials

The Stevenson Company

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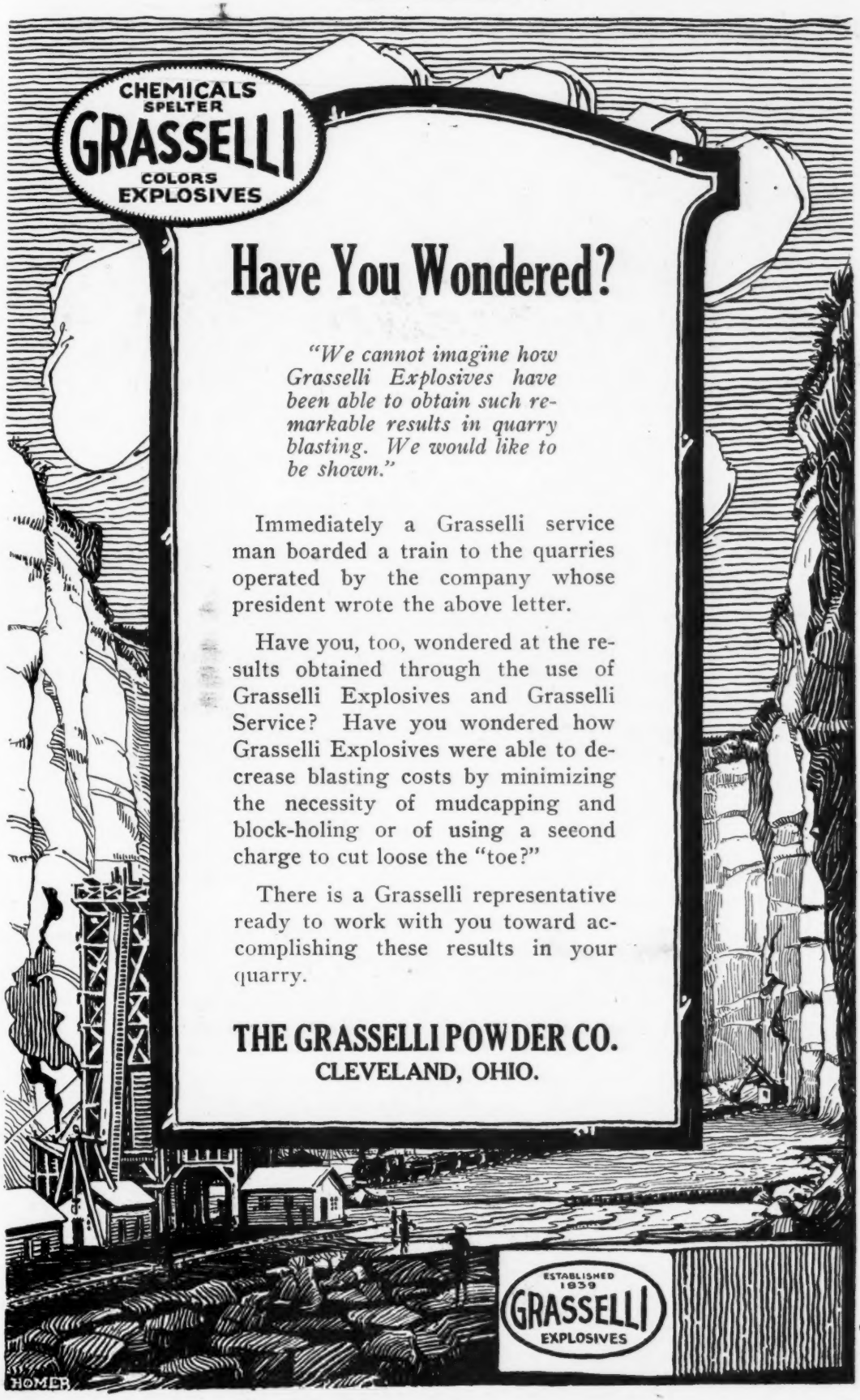
CHEMICALS
SPELTER
GRASSELLI
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EXPLOSIVES
Have You Wondered?
"We cannot imagine how Grasselli Explosives have been able to obtain such remarkable results in quarry blasting. We would like to be shown."
Immediately a Grasselli service man boarded a train to the quarries operated by the company whose president wrote the above letter.
Have you, too, wondered at the results obtained through the use of Grasselli Explosives and Grasselli Service? Have you wondered how Grasselli Explosives were able to decrease blasting costs by minimizing the necessity of mudcapping and block-holing or of using a second charge to cut loose the "toe?"
There is a Grasselli representative ready to work with you toward accomplishing these results in your quarry.
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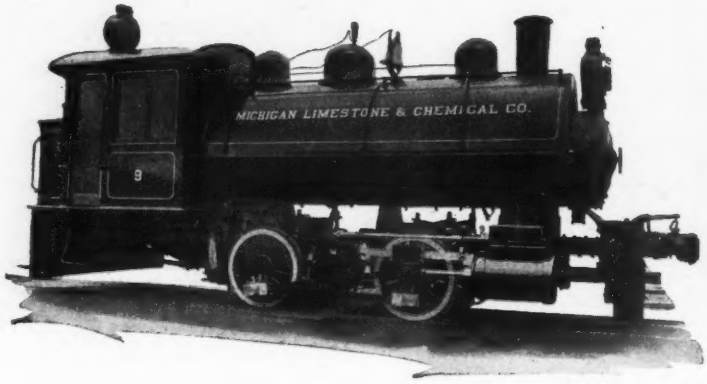
CLEVELAND, OHIO.
ESTABLISHED 1839
GRASSELLI
EXPLOSIVES
HOMER

Accessibility to all parts a feature of



VULCAN Locomotives

There is a distinct advantage in having a locomotive which is so built that nearly all of the ordinary adjustments and repairs can be made without the necessity of maintaining an expensively equipped shop or sending it away for comparatively small changes or repairs.

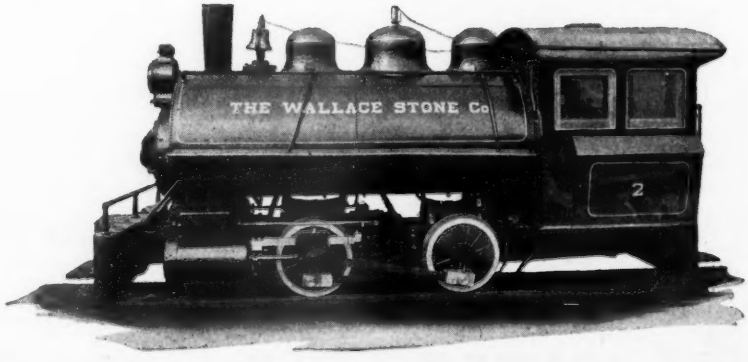
This accessibility to working parts is one of the advantages built into VULCAN Locomotives and is one of the reasons for their low maintenance records as well as for the number of repeat orders from firms who have use for more than one locomotive.

Catalogs and detailed information on request. If you will describe your transportation problem, we can assist you in determining the most suitable type of locomotive.

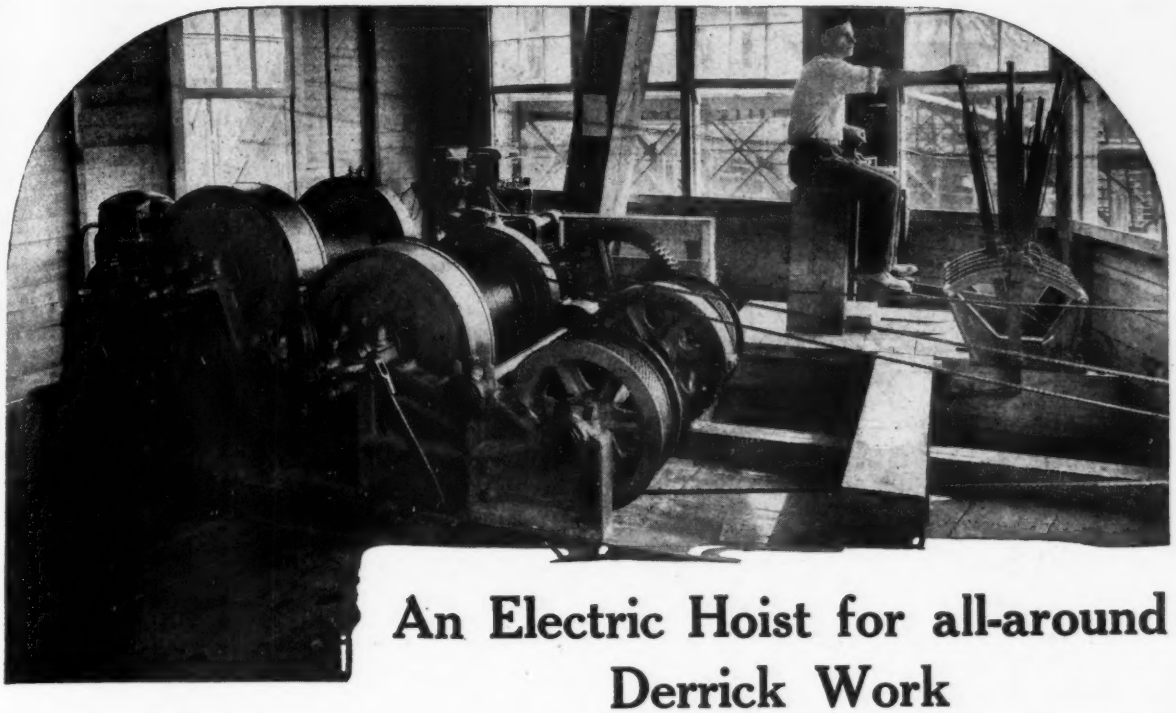
VULCAN IRON WORKS

Locomotive Builders for 49 Years

1753 Main St. **Wilkes-Barre, Pa.**



Two typical VULCAN Locomotives in quarry service. Note the space between the boiler and engine frame which makes the free access to the driving mechanism.



An Electric Hoist for all-around Derrick Work

THIS "AMERICAN" Derrick Electric Hoist has two friction drums for hoisting—two reversing drums for slewing—a counterweight drum for grab bucket work, and one winch head. It can swing the boom of a derrick while the load is being lowered or raised. Naturally, this makes for fast work.

This is a safe, rugged, dependable hoist with the cool running "AMERICAN" Expansive Frictions, and the "AMERICAN" Roller Ratchet Brake, which prevents the hoist from backing up and dropping the load if the current is shut off suddenly.

These standard features place "AMERICAN" Electric Hoists at the head of their class:

Perfect "AMERICAN" Frictions, Bronze Bushed Drums, Roller Ratchet Brakes, Amply Powerful Brakes, Wrought Steel Drum Ratchets.

No matter where you are, an "AMERICAN" representative can reach you in twenty-four hours.

"Give me where I may stand and I will move the world."

American Hoist & Derrick Co.

Saint Paul Minnesota

Builders of "AMERICAN"

Hoisting Engines	Locomotive Cranes	Sugar Cane Machinery
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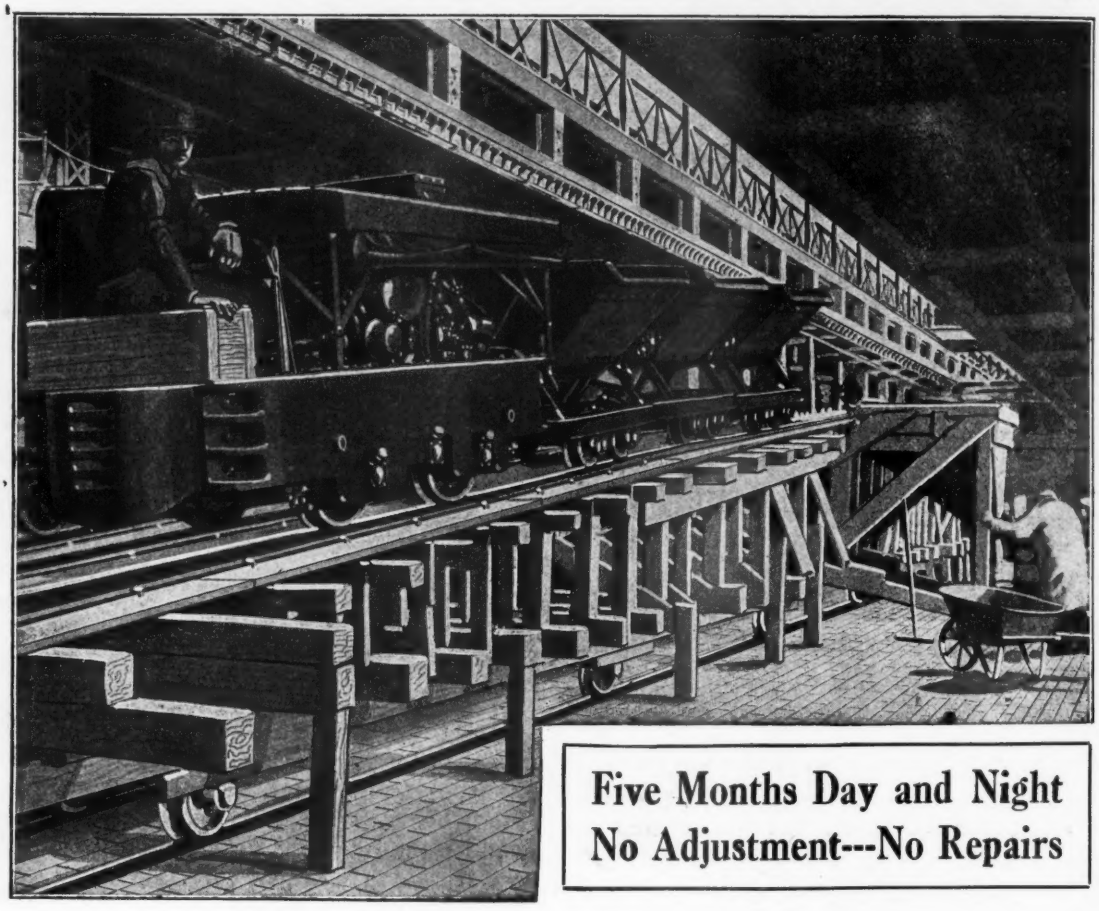


Five Months Day and Night No Adjustment---No Repairs

For five months a 3-ton PLYMOUTH Gasoline Locomotive was employed by The H. F. Friedstadt Co., General Contractors, in operations for the government at the Naval Base, Hampton Roads.

The contractors say in a letter that it gave wonderful service. Notwithstanding it was used continuously day and night, and oftimes full 24 hours without a let up.

They add that a grade of full 12 per cent or better did not reduce the efficiency of the Locomotive. Neither was it necessary to adjust the eugine or make repairs of any sort.

There's a PLYMOUTH awaiting your order and ready to give you a like service without complaint, or demand for increased pay. It is built to serve and take the grief and knocks.

Write for descriptive literature.

THE FATE-ROOT-HEATH COMPANY, Plymouth, Ohio

PLYMOUTH

Gasoline Locomotives

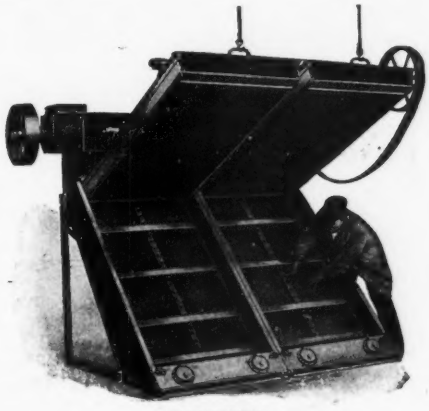
"ONE MAN – ONE MINUTE"

STURTEVANT "OPEN-DOOR" MACHINERY

Crushing, Grinding, Screening, Elevating, Conveying, Weighing and Mixing

No one doubts the saving effected by the Open Door which allows one man to do the work of a whole gang of men and in less time. Minutes replace hours. One man replaces many men—shut-downs, for replacements, inspection or cleaning are short. Production is almost continuous, non-productive "waiting" labor is eliminated; overtime and Sunday work is not necessary, all because everything is quickly accessible. The parts are easy to get at—the machines therefore can be kept in perfect condition for maximum outputs.

If trouble occurs it is instantly found and remedied through the Open Doors—the machines do not have to be taken apart by experts and valuable time lost. Just swing the door open, exposing every working part, and remedy the difficulty.



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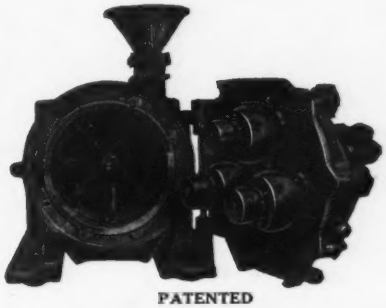

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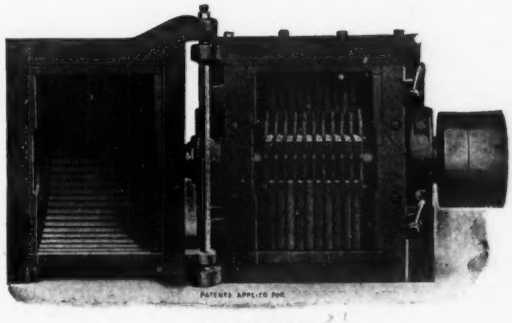

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HARRISON SQUARE

TELSMITH

For Crushing Hard Gravel Boulders

See the boys in the upper left hand corner of this picture? They are watching a No. 5 Telsmith Primary Breaker crush hard gravel boulders. The big hard-heads are broken with only one pinch apiece—and that goes for the black, shiny fellows too. They don't slip; and they don't jump. If they did, our friends above the crusher wouldn't be there very long. But the Telsmith head GYRATES HORIZONTALLY, the stroke being the same length at the top of the bowl as at the bottom. It grips big, smooth, water-washed boulder solidly—cracks 'em—crushes 'em—discharges 'em—all without any fuss or frolic—all just in the day's work.

Now, let us ask you a question. How would you like to stand close above any other breaker, jaw or gyratory, while it was crushing hard gravel? No reply is necessary; but just figure out for yourself what Telsmith's parallel pinch means in terms of reduced labor and increased output.

Does your catalog file include data about Telsmith Primary Breaker—the crusher with the RIGID SHAFT, the short frame, low-arch crown, big eccentric and force-feed lubrication? If not, you had better send for catalog No. 166 (Telsmith Primary Breaker) and bulletin No. 2-F-11 (Telsmith Reduction Crusher).

SMITH ENGINEERING WORKS

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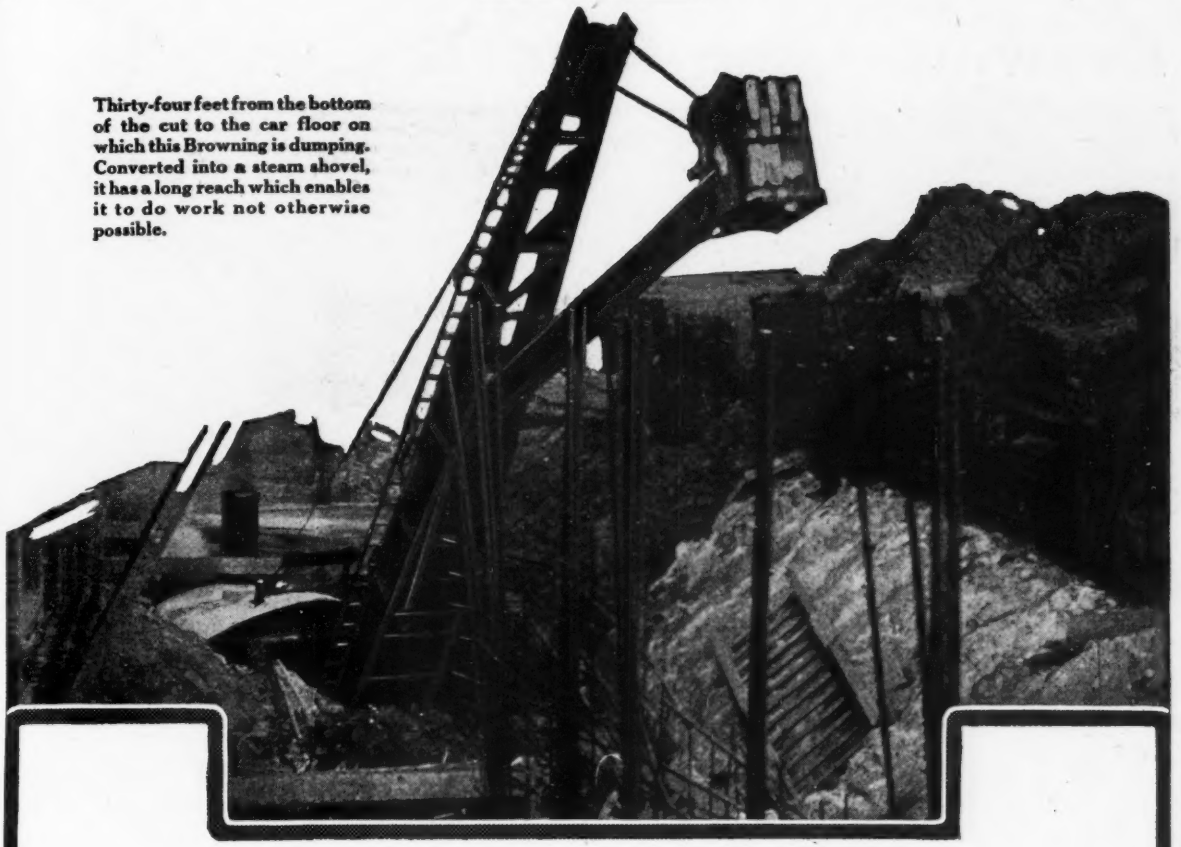

Thirty-four feet from the bottom of the cut to the car floor on which this Browning is dumping. Converted into a steam shovel, it has a long reach which enables it to do work not otherwise possible.

HERE the profit-making possibilities of a Browning Crane are graphically shown. Quickly converted into a steam shovel. it has reached a depth at which it would be impossible for an ordinary steam shovel to work. This feature of great adaptability is one of the big reasons why Browning Cranes are used by those who know them. Another reason is the fact that Browning Locomotive Cranes and Browning Buckets are the sole products of the Browning plant. Every energy of every executive, designing engineer and mechanic is directed solely toward the one goal, viz.: the production of the most efficient cranes and buckets it is possible to produce.

To find out how well they have succeeded, write for catalog and production figures on your own lines of work

THE BROWNING COMPANY, Cleveland, Ohio

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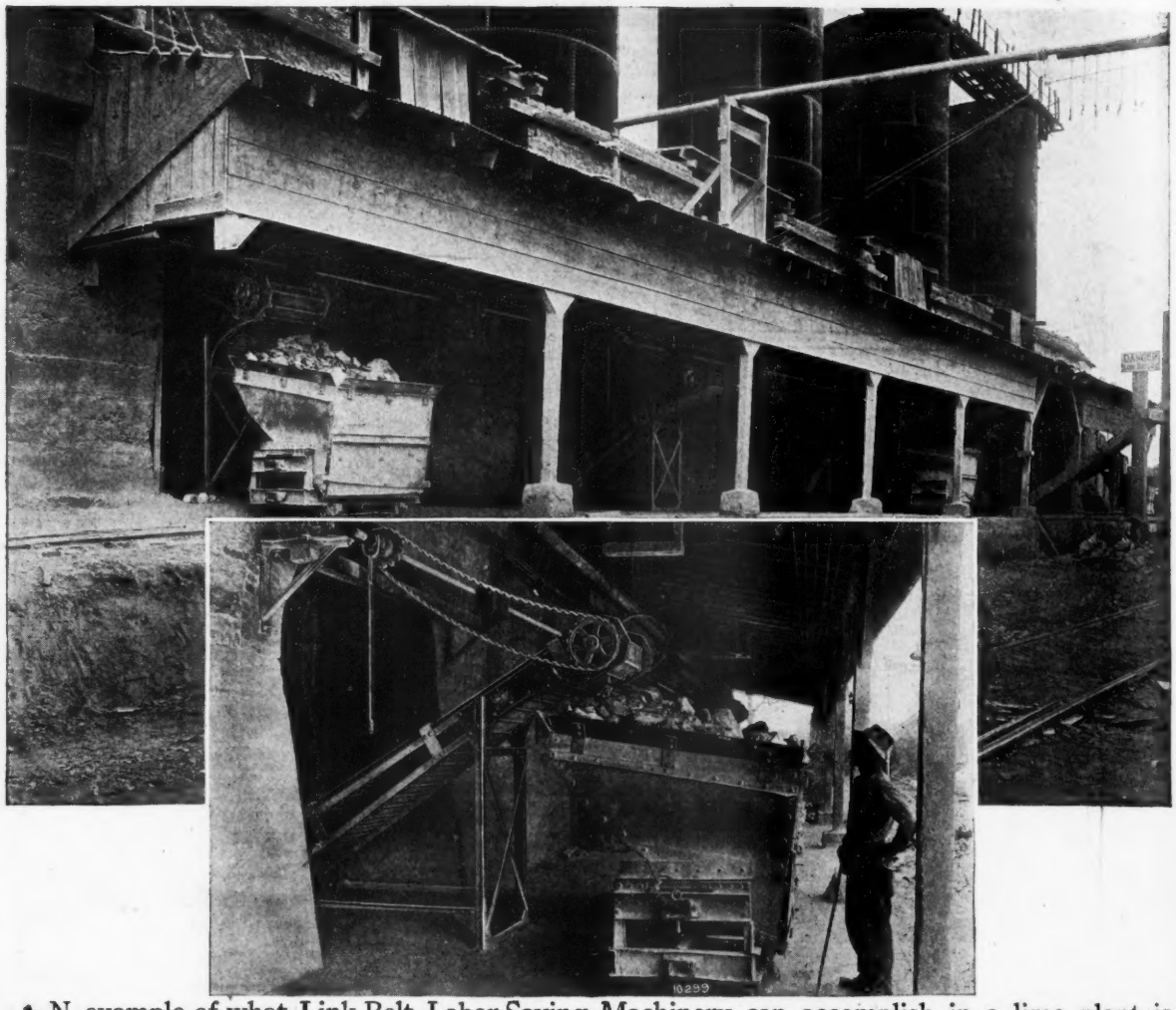
BROWNING
LOCOMOTIVE CRANES

Drawing Lime from Kilns to Cars



AN example of what Link-Belt Labor-Saving Machinery can accomplish in a lime plant is illustrated by the equipment shown by the above pictures which we recently furnished to the Merion Lime & Stone Co., Norristown, Penna.

This is a low-priced, economical installation consisting of a few simple self-contained, all-steel pan conveyors which handle the lime from kilns to cars. The entire plant is operated by a 5 H. P. motor by means of jaw clutches from a low-speed lineshaft.

The entire row of kilns are drawn with only two men—night shift, and two, day. You know what this means in the reduction of labor costs alone.

The entire equipment will pay for itself in one season. While the arrangement of this installation is typical, modifications can be easily made to take care of almost any conditions. Why not investigate? Get in touch with us today.

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LINK-BELT
LIME HANDLING MACHINERY

Rock Products

Vol. XXIII | Chicago, July 31, 1920 | No. 16

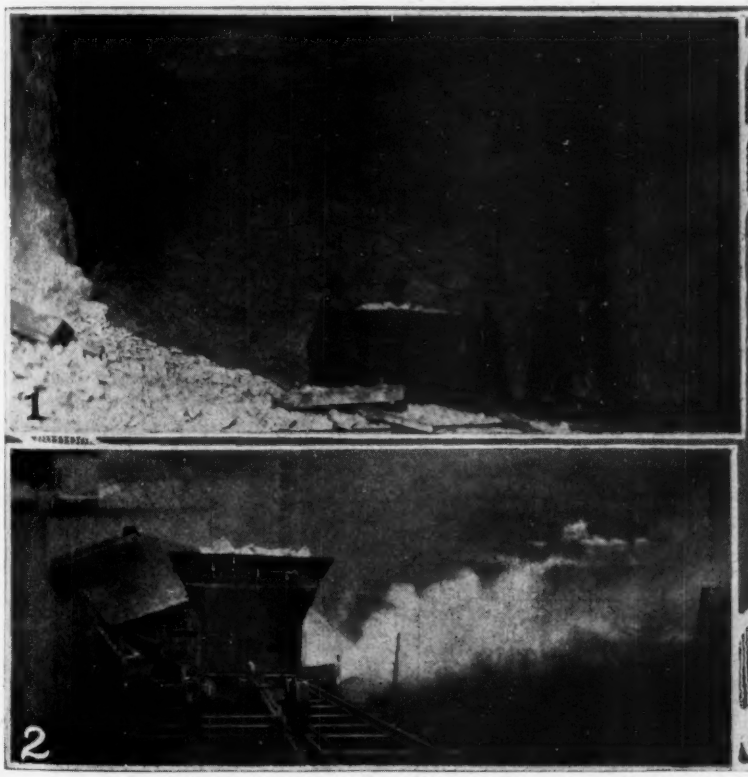
Crushed-Stone Product Shipped to Thirty-Eight States

Willmingham Stone Company, Whiteside, Georgia, Quarries Very White, Pure, Hard Dolomite for Variety of Uses

IT IS RARE INDEED that a crushed stone producer has such a valuable material that it is marketed over half of the United States, but such is the case with the stone produced by the Willmingham Stone Co. at its Whitestone, Ga., plant. This company has its general offices in Atlanta, Ga., and owns one plant at Gainesville for the production of commercial crushed stone and pulverized agricultural limestone, and another at Whitestone.

The plant at Whitestone is entirely devoted to the production of terrazzo stone, pulverized agricultural limestone and stone for chemical and metallurgical purposes. Whitestone is located in the marble district of Georgia, and the deposit being worked is a very hard, white, fine grained almost pure dolomite limestone. Its beautiful white color and hard, fine grained structure make it so valuable in the construction of terrazzo floors that it is shipped all over the Central States and considerable of it into the Eastern States. Its chemical purity (99.2 per cent pure carbonates) and the uniform run of the product makes it a good pulverized agricultural limestone, a fluxing stone for copper and of use in the chemical industries such as the manufacture of glass.

The deposit is underneath a large mountain and is being worked in a drift mine. The seam runs from 35 to 50 ft. thick and since the deposit has been



Mining white limestone for terrazzo floors at plant of Willmingham Stone Co., Whiteside, Ga.; also produces agricultural limestone and stone for chemical industries

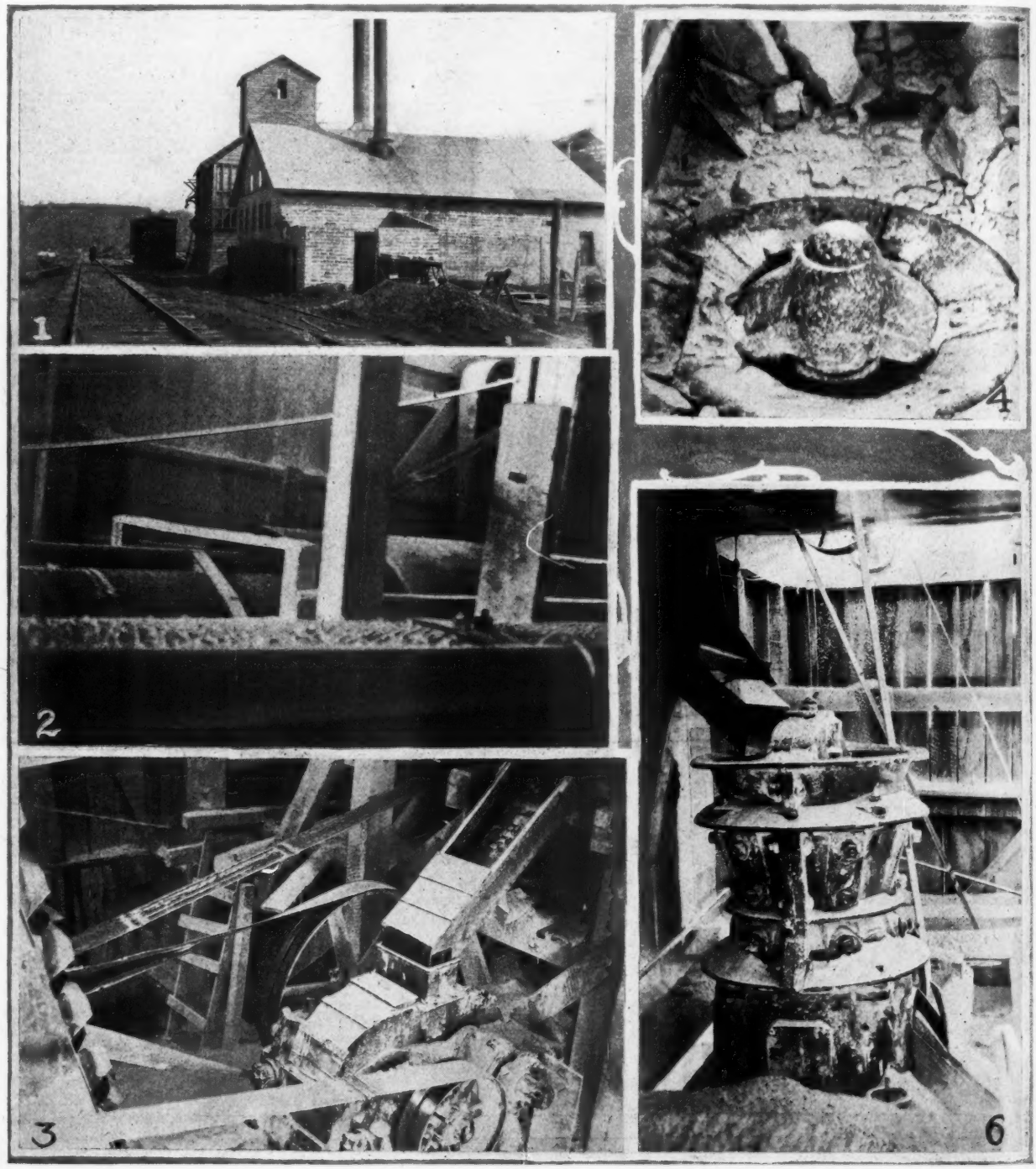
C. H. Willmingham, president and general manager, and W. W. Davis, superintendent

worked for seven years the mine is well opened. Because the stone is so tough or hard the mine is opened in very large rooms with an unusual span of roof without any danger.

Small compressed air operated hand drills are used to hole for the shots and 40 per cent dynamite is used to blast the stone loose. The strata worked have a good strong limestone ceiling and the entire deposit is being removed as the mine is extended. The stone is removed in benches of about 15 ft. in height and 60 ft. in length.

The material is all hand loaded into specially built, narrow gauge one-ton steel end-dump cars. The opening of the mine is considerably above the crushing plant and the cars are lowered down an incline to the initial crusher. This is a small gyratory. The car loads of one-man size stones are emptied into a large bin, the floor of which also makes the platform about the crusher.

The stone is sledged and fed by hand to the crusher—each piece being inspected to see that it is faultlessly white and



1. Plant of the Willmingham Stone Co., Whiteside, Ga. 2. Jacketed sizing screen for terrazzo stone separation. 3. Hammer mill pulverizer following initial crusher. 4. Initial gyratory crusher. 5. Rejections crusher

that the structure is good. One or two yellow streaks have been found in the face and since any discolored stone would spoil the product for terrazzo floors this must be carefully guarded against.

Advantage was taken of the hillside in the construction of the plant and the crushers were mounted so that the stone will flow by gravity from the discharge of one to the entrance of the next. A double-roll crusher is mounted just at the foot of the small gyratory crushers.

A large jacketed, cylindrical screen, 42-in.x18-ft., is used to make the separation. The largest perforation is such as to give a ¾-in stone. All larger material is rechuted to a No. 1½ open door Sturdevant crusher. The terrazzo stone is a graded product from ¾-in. down with all dust and fine material removed.

Two Gardner pulverizers further reduce some of the stone for agricultural limestone and other uses. The discolored stone, which is just as good from a chemical analysis standpoint, is sold to the manufacturers of epsom salts and carbonic acid. The fine 200-mesh material is sold as an asphalt filler. Newago screens are used to classify the finer size. The agricultural limestone is made on the jacket of the rotary screen and is 14-mesh down material.

The mine has a daily capacity of 300 tons, whereas the crushing plant has only 100 tons per day capacity. The mine is worked only during the day, whereas the crushing plant is operated the entire day and night. With the addition of some new vibrating screens the crushing plant will have a 24-hour capacity of 150 tons, which will run about 100 tons of stone and 50 tons of dust.

Immediately under the bins are spouts to be used in bagging the pulverizing product, or box cars may be pulled alongside the bins and loaded by gravity.

The company manufactures all of its own power from a 175-h. p. return-flue boiler. The entire plant is driven by a 150-h. p. Allis-Chalmers steam engine. Lights are supplied with current from a small generator driven by a separate 5-h. p. engine.

Storage is provided for 21 cars of material in overhead bins. The space devoted for agricultural limestone is proportionately large—12 cars—because of the seasonal demand. Because of the chemical purity and the fine grinding of this product it is shipped very widely.

This company probably could challenge any other quarry operator as to the shipping radius of its product. Customers have been supplied in 38 states of this country, and also some parts of Canada. These people have wanted this superior grade of terrazzo floor stone so badly that they have paid from 80 cents to $19.60 per ton freight on it.

Lime Recognized Plant Food

Scientific Men No Longer Contend Lime Is Merely a Soil Conditioner

IN AN ADDRESS delivered at the Mid-West Fertility School on June 8, 1920, Prof. Myron A. Bachtell of the Ohio State University, College of Agriculture, Columbus, Ohio, gives the recognition to lime (calcium) as a plant food that has been so long a matter of controversy among scientific men. He acknowledges what some few progressive lime men have always contended.

Professor Bachtell said:

"**Calcium**—The great regulator of the reaction of the soil solution is calcium. For a considerable number of years it has been recognized that soil acidity has marked influences on the general fertility of soils. The physical, biological and chemical conditions of soils are affected by the amount of calcium they contain. For this reason much has been said concerning the 'lime requirement' of soils. Truog, of Wisconsin, has stated that a more desirable expression is the 'lime requirement' of plants. He says: 'The expression lime requirement of a plant refers to the actual lime needs of the plant itself, especially as to the ease and rate at which lime must be secured from the soil by the plant for normal growth.' Furthermore, he says: 'In most cases it thus appears that the main specific harmful influence of soil acidity on certain plants is due to its influence of preventing these plants from getting at a sufficiently rapid rate the calcium as the carbonate or bicarbonate which is needed to neutralize and precipitate certain acids in the plants themselves, which are probably largely by-products, produced as the result of certain vital reactions in the growth of plants. If calcium in these forms is not furnished at a sufficiently rapid rate, then the rate of these reactions is lowered accordingly, as is also the rate of plant growth.' The factors which determine the lime requirement of plants are (1) lime content, (2) rate of growth and (3) feeding power of the plant for lime.

"Calcium in combination exists as phosphate, nitrate, sulphate and the various lime compounds. The various calcium compounds (with the exception of the nitrate and phosphate) usually are referred to as soil amendments rather than fertilizers This is because it generally has been understood that limestone and its products have been used to correct some conditions in the soil other than deficiency of plant food. The reason that so little stress has been laid on calcium as a plant food is that when lime or limestone is used in sufficient amounts to keep the soil from becoming acid, there is plenty of calcium for plant food purposes. It should always be remembered, however, that calcium is as much a plant food as nitrogen, phosphorus or potassium, and as such it has as distinct functions to perform as any of these three. Among the functions of calcium might be mentioned:

"1. To strengthen the cell walls.

"2. To aid in transference of starch.

"3. To develop vigorous roots and root hairs.

"4. To neutralize acids inside the plant.

"5. To encourage the growth of clover.

"**Magnesium**—This element bears a close relation to calcium, and occurs in much the same forms. It has received much attention because of the claims of some investigators that when the proportion of calcium to magnesium fell below a certain ratio the magnesium became toxic. The proportion of calcium and magnesium in the soil solution is determined partly by the total amount in the soil and partly by the rate of solubility of the compounds in which they are contained. In general, magnesium is less soluble than calcium.

"The Illinois Experiment Station applied magnesium carbonate to soil in amounts of 4, 8, 12, 16 and 20 tons per acre. Above 8 tons the results were injurious. Growth practically ceased with 20 tons. In practice, pure magnesium carbonate is never applied to soils, but dolomitic limestones may contain as high as 44 per cent. This would have necessitated the use of over 16 tons of dolomite in the Illinois test to have carried the 8 tons of magnesium carbonate which was found to be harmful. There probably is no danger in practice of applying sufficient magnesium to be injurious.

"Among the functions of magnesium may be mentioned the following:

"1. It helps in the formation of seeds.

"2. It assists in the formation of starch and protein.

"3. It aids in the assimilation of phosphates."

Agstone Men to Consider Uniform Lime Law

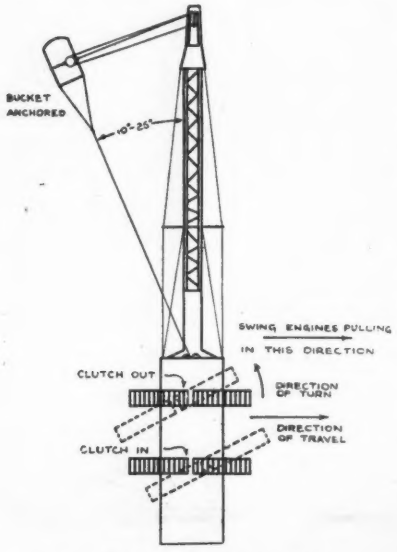
FRED KANENGEISER, general manager of the Bessemer Limestone & Cement Co., Bessemer, Pa.; W. M. Brown, of the France Stone Co., Toledo, Ohio; A. B. Meyer, president of the Mid-West Crushed Stone Quarries Co., Indianapolis, Ind., have been appointed a legislative committee of the National Agricultural Limestone Association to consider and act upon the proposed uniform agricultural lime law, prepared by the National Lime Association.

Hints and Helps for Superintendents

Sluing a Caterpillar-Mounted Drag Line

C. J. De FREES of Worthington, Ind., sends to "The Excavating Engineer" (July) a description of the method he uses to slue his Bucyrus Class 14 caterpillar-mounted drag line.

The caterpillar clutch is first thrown out in the manner usually employed in turning. Next swing 100° to 115° from the direction in which the drag line was moving, swinging towards the direction in which it is desired to move. Then throw out bucket anchoring it firmly in the ground. After pulling in tight on the drag line, set the brake on the drag line drum. The boom is then swung



Method of sluing a dragline

back 10° to 25° as the case may be to a position 90° from the direction of travel. Then set the brake on the hoist drum and hold the strain of the swinging engines away from the direction of turn. When the propelling clutch is thrown in, in the usual manner, this strain will cause the machine to slue in the desired direction.

Mr. De Frees states that he has turned his drag line by this method 50° in three feet.

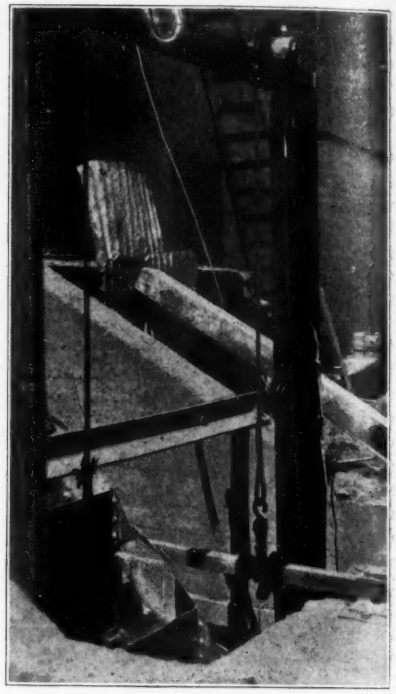
This manner of turning will prove very useful in many instances, but good judgment must be used by the operator not to throw in too much power on his swinging engines or he will cause the hoisting line to jump the point of the boom sheaves and perhaps do a little damage thereby.

Safety Device for Large Bucket Elevators

SAFETY AND ECONOMY BOTH require precautions against the breaking of a link in a roller-chain bucket elevator of large size. If the chain breaks near the top, where it is most likely to, for that is where the maximum strain is, gravity will carry the buckets down into the pit, and anyone near the open front of the conveyor or elevator frame is likely to get hurt. The tendency of course is for the string of buckets to bulge out or whip out and do serious damage.

The device shown herewith is a simple scheme developed at the plant of the Riverside Portland Cement Co., Riverside, Calif., to prevent just such an accident. The large bucket elevator shown leads from a tunnel to the raw material bins of the preliminary grinders. The device shown is at about the middle point of the elevator, or at the place where workmen would be apt to be caught.

The safety device is very simple, consisting of two counter-weighted steel bars, hinged at one end, with the other end wedge-shaped and free to ride the rollers of the bucket chain. Each roller lifts the bars and passes under them, the bar dropping back against the track under the rollers. Should the chain break, the rollers would, of course, ride the bars to the stops, a foot or two back, and the downward fall of the bucket chain would be arrested.



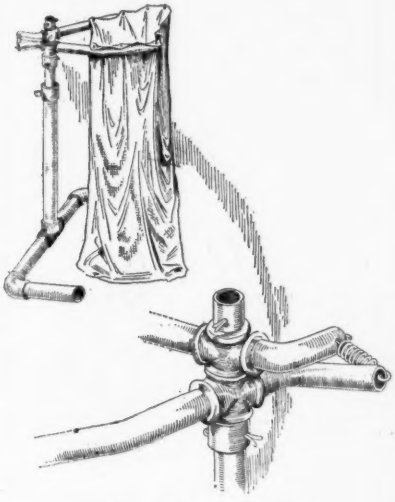
Safety device for large bucket elevator

The superintendent of this plant is Earle MacDonald, who has devised a number of other operating features of interest. The Riverside company is one of the largest cement producers on the Pacific Coast and one of the longest established. It is a leader in accident prevention and employees' welfare work.

Roller passing under safety bar

Easily Made Bag Holder

FILLING A BAG with a shovel without any mechanical means of holding the bag requires a man with at least three hands if the operation is to be performed with any degree of neatness and dispatch. Bag holders can be purchased, of course, but the illustration shows how to make one out of old pipe fittings and a spring to hold the jaws apart. The bag can be held at any height by adjusting the set screw in the coupling.—L. V. Lauther, in "Engineering and Mining Journal."



Easily made bag holder

Special Drills for Broken Quarry Ledge

THE DIFFICULTIES involved in stripping the top of a badly eroded ledge of limestone at the Independence, Mo., quarry of W. M. Spencer were described in these columns on June 5, 1920. Mr. Spencer's method of meeting the drilling problem is even more original than his stripping operation.

The drill shown in the accompanying illustrations is built on a body 7x24 ft., made of 8-in. I-beams. The tower or drill frame is made of 7-in. I-beams, 24 ft. high. The 30-h.p. steam boiler is mounted on the frame body and also a 5-h.p. Dake turbine hoist engine.

The two drills, one on either side, are the Sullivan FS 14 submarine type of steam drill. They are raised and lowered in the tower frame, by the small hoist engine. These drills use 12 and 24 ft. hollow steel drill rods. The hole is started with the 12-ft. drill and finished with the 24-ft. The hole drilled is 2¼-in. in diameter.

The drill frame is moved by means of skids and rollers on a wooden timber cribbing. The quarry top is too full of holes for use of a well drill, and the device shown answers most of the purposes of a well drill, and it drills four holes simultaneously.

Example of badly eroded quarry face

Top of ledge showing eroded surface

Special type of quadruple drill used

To an Eastern quarryman it would not appear that such a ledge could be quarried at a profit, but this ledge is really more or less typical of the limestone from Kansas City district to Omaha on the west. Not only is much more stripping required than is the case with Eastern deposits, but in general the stone is seamy and eroded as in this case.

In Omaha quarries well drills have been employed successfully and hydraulic methods are used for stripping, because the quarries face the Mississippi River. At Mr. Spencer's quarry hydraulic stripping was out of the question because there is no way to dispose of the water.

Mr. Spencer's crushing plant has slugger rolls for a primary breaker.

The Design of Sand and Gravel Screening and Washing Plants

V. Washing, Distributing and Storing

By Frank M. Welch
Chief Engineer of the Greenville Gravel Co., Greenville, Ohio

PRACTICALLY ALL bank and gravel requires washing, if it is to be used in concrete work of any sort. Even if the raw material in the bank is clean enough for most commercial use, or if the market does not demand a washed product, the washing process should be installed to gain capacity. The use of a sufficient amount of water will double the capacity of any revolving screen over that of dry screening. In fact if the bank run is damp, it will so clog the screens if more water is not added, that their capacity will be almost nil. The expense of pumping ample water to the top of the plant is paid for several fold, by the capacity added. Where gravity screens are used water is practically indispensable.

Unless the material is exceptionally clean, a scrubber should precede the screening process. In the plants where unit screens are used, the scrubber is usually also a separate unit. Where the multi-jacket screen is employed, however, an excellent design is to install the scrubber as a dead or blank section 4 to 6 ft. long at the receiving end of the screen. The scrubbers are equipped with blades, vanes or paddles which serve to agitate the material and water, to scour the gravel with the sand, and to get the greater portion of the clay and loam into solution in the water. For this reason, the bulk of the washing water should be introduced at the feed spout. Usually a large stream enters the material immediately after it leaves the conveyor or elevator.

Automatic valve-operated sand-settling tanks

This bulk of dirt-laden water passes through the screens almost immediately after reaching the first perforations. A 2-in. or 3-in. pipe, according to the size and capacity of the screen, should pass through the inner jacket. This pipe should be perforated on its under side, thereby spraying, rewashing and rinsing the material as it passes through the screen. The perforations in the pipe should end a foot or two before the end of the first perforated section, to eliminate in so far as possible, water getting into the gravel bins. All of the water, including the original washing and scrubbing water, passes through both outer jackets and with the sand to the settling tanks.

Typical automatic settling tank installation

With the single unit screens, water is added at each unit and often a separate spray plays on the material as it is rejected from each screen for final rinsing. In every washing system, the entire volume of water should eventually reach the settling tanks, thereby allowing no water to reach the gravel bins, since this always results in a constant rain of water under the bins, which hinders loading and creates sloppy conditions which should be confined under the sand bins only. This feature is not quite so important where side loading prevails.

Sand-Settling Tanks

Settling tanks exist in several forms. Two or three designs of automatic tanks have been perfected, which give satisfactory results. The operation of all of them depends upon the weight of the

sand in the tank, when filled to a certain point, overbalancing counterweights. This automatically tilts the tank, simultaneously opening one or more valves at the bottom thereby allowing clean sand to discharge. An overflow spout is provided at the top of the tank where the bulk of the water laden with clay or loam in solution passes to a sluiceway leading to some low spot on the property which has already been excavated. If any dirt remains in the water not in solution, it is light enough to float on top of the water and pass out with it. The tanks are usually of steel construction, supported on knife edge fulcrums to increase their sensitiveness.

Stationary settling tanks of wood, concrete or steel construction are still in use at some plants, where the nature of the operations requires a man on the plant, who has ample time to attend to the opening and closing of the tank at intervals. These tanks operate on the same gravity principle of the automatic tanks, except that they do not discharge automatically. Regardless of whether the automatic tank will eliminate a man or not, its use is advisable, as it is by far more reliable than the average available man for this purpose. The man can be distracted by other duties or attractions, while a valve is open, resulting in the flooding of the sand bin, and everything under it.

During the evolution and perfection of the automatic tank, several designs of power-driven settling tanks were built, several of which are still in use. They also have the gravity principle of the dirt-laden water overflowing at the top and the clean sand settling to the bottom. The sand, in these tanks, instead of discharging through a valve near the bottom, is dragged up an inclined side of the tank, by means of a flight conveyor or cast iron screw conveyors. Many of these designs produce clean sand, but wear and tear on the machinery is very great and power is used which could be eliminated by the automatic tank.

Amount of Water Required

The amount of water necessary for adequate washing depends upon the percentage of dirt to be eliminated. Regardless of washing requirements, too much water cannot be used, because every gallon of additional water increases the screening capacity of the plant as well as more thoroughly cleansing the material. A good rule to follow however, under average conditions is: One gallon of water per minute per yard per ten hours capacity of the plant. Less will often do the work well, but more will always do it better.

If a plant is not located near a stream or lake, sufficient water supply is often unavailable, even though several deep wells are sunk. Under such conditions the same water or part of the same can be used over and over. This is accomplished by forming a lake in a portion of the pit which has been worked. The refuse together with the bulk of the water, which overflows the settling tank is spouted to one end of the lake. From a remote end, clean water is pumped, having freed itself of clay and loam by settling, while flowing from one end of the lake to the other. Unless low ground of considerable area is available for this purpose, it is found necessary every year or two to re-excavate the lake.

Distributing

In the design of a sand and gravel washing plant, proper and efficient distribution is a feature that is often neglected. In plants where little or no bin storage is desired, the problem of distribution is not so difficult. However, if large storage is desirable, the screens and spouts should not only be arranged to fill all the bins, but a system of distribution should be planned whereby different grades can be stored in the same bins and the same grades in remote bins. Such flexibility permits maximum utilization of all bins regardless of varying pit and shipping conditions, and very frequently avoids a plant shutdown awaiting the emptying of one or more bins. It furthermore makes it possible to produce almost any desired mixture of material which the market may demand.

Where the triple-jacketed screen is used, the grades are produced at a central point, which permits all or part of any grade to be mixed with any other and spouted to any bin which happens to be empty. Fly-valves arranged near the tops of the various spouts furnish flexibility with much less waste of time than is required in changing screen sections.

Although distributing spouts are often made of steel, it has been found very advantageous to construct them of wood, thereby facilitating alterations. The bottoms and 4 to 6 in. of the sides should be metal lined not only for protection but to eliminate friction. For the bottoms white iron is the most serviceable, where only sliding occurs. Stones must not drop from any distance on white iron as it breaks readily. For this reason a heavy steel or manganese plate is used where the fall comes.

Chutes handling coarse gravel of even grade should slope about 7 in. to the foot; mixed gravel and crushed material 8 to 9 in.; raw material containing sand, 9 to 10 inches. The slope of spouts conveying sand must be determined by the amount of water flowing with the sand. Where it is found desirable to install a spout flatter than material will slide on readily, a round bottom will often solve the problem.

Storing

The amount of bin storage with which it is advisable to equip the average plant is an open question with many operators. At some large plants where three or four loading tracks are employed, no bin storage whatever is provided, except small centering hoppers large enough to permit the shifting of cars without spillage. Other plants have storage room for one, two or three car loads of each grade produced, while still others provide for a total storage of 75 to 80 cars. The greater storage acts as an equalizer between temporary plant shutdowns and car shortages. In large installations, the eliminations of delays amounting to an hour or two a day will pay the interest upon the cost of very extensive bins. Such bins should be constructed of concrete or their life will be comparatively short and the investment a poor one after all.

Rather than install such expensive bin facilities ground storage is often resorted to, as an auxiliary to the small bins under the screens. If ground storage to any great extent is made possible, an overhead belt conveyor, extending from the screens or from the bins, over the adjacent yard is necessary. This conveyor is equipped with one of the several types of trippers, which discharges the various grades at any desired point underneath. The material can then be reclaimed by a clam shell or other type of excavator and loaded direct into cars, trucks or wagons. The more modern ground storage plants are equipped with one or two belt conveyors installed in a tunnel underneath the pile. Gates at about 10-ft. intervals in the roof of the tunnel feed onto the belt which discharges the material either direct into cars or into loading bins.

(To be continued)

Feldspar Production in Canada Increasing

MORE FELDSPAR mines are being opened in Frontenac County near Kingston as additional areas of this rock are being discovered. The center of the feldspar mining industry is now at Tichborne in Eastern Ontario at the junction of the Canadian Northern Railway and the Canadian Pacific Railway. The feldspar exports are increasing rapidly, the exports for March, 1920, being 2,709 tons valued at $14,007, of which 2,669 tons went to the United States. For the 12 months ending March 31, 1920, the exports totalled 24,358 tons of which 24,198 tons were exported to the United States. The value of the exports for the year ending March 31, 1920, was $122,329 as compared with $116,349 in 1919 and $81,098 in 1918.

"Marque Speciale" Swiss Cement

New Portland Cement with Remarkable Properties for Developing Early Strength

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DURING A VISIT to Switzerland in April of this year it was the writer's privilege to visit the Holderbank-Wildegg portland cement factory at Wildegg near Zurich. This factory is of such unique interest both with regard to the automatic nature of the method of production and the extraordinarily good quality of the portland cement produced, that a few words about the factory and the cement itself will no doubt be of interest.

So startling is the quality of this cement that considerable enquiries were made by the writer, and he was given some interesting data, which he had the opportunity of verifying for himself. He availed himself of this opportunity and in consequence is of the opinion that it is difficult to underestimate the effect that the "Marque Speciale" portland cement manufactured at Holderbank will produce upon the portland cement industry of the world, when the full facts are made known by those interested in the factory.

The factory was designed to produce 120,000 metric tons per annum, but in Switzerland there is a board of control which distributes the output proportionately over the various factories and Holderbank's share is only rather more than half this quantity. Thus the factory is working under great economical disadvantages, and the financial success it has achieved is all the more to its credit.

The method of production is worthy of note, but the quality of the finished product is such that it is difficult to state its nature and properties without appearing to exaggerate. In short, such quality has not been placed on the market anywhere else within the writer's knowledge. It will be as well to write a few words about the method of production, although these will necessarily be incomplete as there are certain processes which are the secret of the manufacturers. It must therefore suffice to indicate the general lines of manufacture.

Quarry Operation

The raw material is an argillaceous limestone interstratified with shale. It is excavated from a hill situated about 200 to 300 yards from the works and it varies considerably in composition throughout the deposit. It was pointed out to the writer that this variation was one of the chief initial difficulties with which the company had to contend at its outset. How well it has been overcome will be realized where it is stated that the daily lime content of the slurry introduced into the kiln has been constant to the second decimal place for the last two years. The writer looked over these records himself and confirmed this fact, but he did not bother to ascertain figures further back than two years.

The company has expended considerable labor upon the quarry and its method of excavation consists in the formation in the hill itself of gigantic and steep cone-shaped craters. The sides of these craters form the face of the quarry, and portions of limestone and shale are basted out. These portions fall to the apex at the bottom, and by their own weight are forced through an opening into a subterranean tunnel with substantial concrete walls. Here the pieces are shot into trolleys attached to an overhead transporter and are conveyed over the 200 to 300 yards separating the quarry from the factory.

(American quarrymen will at once recognize this process of quarrying as the "glory-hole" method, for a long time so popular in California and the other West Coast states. It has always been considered a peculiarly American institution. This process of quarrying is being largely abandoned now in California and elsewhere, in favor of steam-shovel methods, owing chiefly to the great scarcity of quarry labor.—Editor.)

Crushing and Pulverizing

The cars are tipped onto a grizzly and fed into jaw crushers. From the jaw crushers the material passes through crushing rolls and is then reduced to about walnut size. It is then elevated into a hopper over ball tube mills and is fed into these mills through pan feeds. Water is introduced in the usual way, and the resulting slurry from the ball tube mills is pumped into a series of mixers. These are six in number, each holding roughly 10,000 cubic feet of slurry. These mixers act alternately as correcting tanks and tanks for feeding the kilns.

The slurry is next pumped into a tank situated over the kiln, whose contents are kept at a constant level. The overflow from this tank returns to that particular slurry container which is at the moment feeding the kiln and an agitation due to this circulation results. Compressed air is used for slurry agitation and a perfect mix is obtained.

Kilns and Coolers Combined

There are two rotary kilns and coolers each 216 ft. over all in length and 8 ft. 6 in. in diameter, with enlarged firing zones 10 ft. in diameter. The cooler is attached to the kiln in prolongation and is about 16 ft. long. It might be expected that the clinker retained too much of its heat on leaving. This is not so, as the writer was able to pick up clinker just dropped from the cooler and hold it in his open hand. The proof of the pudding is in the eating and when these manufacturers actually save at least 5 per cent in coal consumption, this method of cooling the clinker must be very efficient.

The cool clinker falls directly onto a Zimmer conveyor, and is then elevated and distributed by another conveyor over a large clinker storage. The quality of the clinker produced is really good and on breaking pieces there was in no case any evidence of free lime. On leaving the clinker storage the required proportion of gypsum is added and the whole is elevated into a hopper over the cement grinding mills, where it is ground to an average of 2.5% on a 180x180 mesh. The cement is then conveyed to a cement store and is ready for use.

The above operations described are on the whole those in general use with the "wet" process of portland cement manufacture, although there are a few outstanding features in the way of machinery, as for example specially designed slurry pumps of cheaper initial cost and running, special air mixing for the slurry, and one or two other machines. But the layout of the factory is so excellent and everything is so carefully arranged with a view to economic production, and there is such minute attention to the detail that cheap manufacture and excellent quality result. In 1919, in spite of the fact that the price of coal was 108 Swiss francs a ton, they sold their cement at about 60 francs a ton. They also succeeded in showing a very substantial profit on the year, which they have done since their initiation in 1913. It is true that their manual labor is fairly cheap and averages throughout the factory about 12 Swiss francs a day.

Cement of Exceptional Quality

The outstanding feature of the factory is the quality of the finished portland cement. The manufacturers have spent years of patient study and research in devising and testing certain methods by which they could increase the growth in strength of the cement, and they have been singularly successful. They have discovered a process, which of course is

secret, by which the strength of the cement in the first few days after setting is made to increase with great rapidity, of which property more will be said later. It must be clearly understood that this growth in strength has nothing whatever to do with the setting time, which can be regulated according to specification.

Of such interest to the industry is this portland cement that certain tests were performed for the writer's benefit on samples selected and sent to London. These were analyzed and tested by a well-known and old established firm of London analytical chemists who specialize in cement testing. The truly remarkable results from the haphazard samples are given below in full.

An interesting test was seen by the writer in the laboratory of this factory in Switzerland and samples of the test were brought away by him. These consist of discs made from the "Marque Speciale" portland cement of 14 in. diameter and 5/8 in. thick, set in an ordinary atmosphere without a damp cloth or any other artificial agency, which demonstrate above all other tests the soundness of the cement. The discs show not the slightest sign of cracking or warping or deformation of any description.

Remarkable Early Strength

The remarkable strength both in tension and compression will be noted after three days. The writer drew up some comparative tables for his own satisfaction and plotted the results in the form of a graph. The curve of growth in strength of the "marque speciale" portland cement showed a strength at three days unequalled by other portland cements in most cases at 28 days. Furthermore the "Marque Speciale" cement continues to grow in strength ahead of all other brands of portland cement known to the writer. It will be noticed that the finished cement possesses a fineness of 2.5% on 180x180 mesh sieve. This is a useful property and one which contributes largely to the high sand-carrying capacity referred to later. The soundness test by the Chatelier method should be observed and it is notable that this cement possesses an absolute constancy of volume at all temperatures. The early rapid growth in strength might be in part attributed to a high lime content and the thought occurred to the writer. However, examination of the analysis of the cement given above shows that this is not the case.

It might be assumed that the cost of producing this cement is greater than that of ordinary portland cement. As a matter of fact, the reverse holds good, and the costs are slightly less owing to a low fuel consumption and the employment of fewer men. Roughly 5% less coal is used for burning in the kiln than for the average "wet" process, and throughout the factory there is approximately a total saving of 15% on the cost of production of ordinary portland cement.

Used for Big Gun Mounts During War

It was during the war that the Holderbank factory first introduced its new methods of manufacture, and it was not until 1915 or 1916 that the "Marque Speciale" cement was put on the market. The output was taken by the French Government, which used it amongst other things for making platforms for heavy artillery. The writer saw several testimonials from French military officials which emphasize the value of the cement. One of these is to the effect that heavy guns mounted on platforms made from "Marque Speciale" cement could be fired upon the fourth day after setting, whereas regulations forbade platforms of ordinary platform cement to be used before three weeks.

The advantages of "Marque Speciale" cement to users are obvious to anyone understanding the requirements for constructional purposes. Owing to its very rapid growth in strength, especially in the first three or four days, it must be invaluable for use at low temperatures, for marine work, etc., and where rapid early tensile and compressive strengths are essential. A tremendous saving is evident when shutterings (forms) for ferro-concrete (reinforced concrete) and other construction can be removed at the end of three days, whereas in the case of other cements these would need to remain in place for a very much longer period.

If only ordinary results are desired, and if there is no special reason for using a cement of such high early tensile strength, this cement can still be used with advantage over ordinary portland cement. The writer was able to confirm this statement by viewing English and Continental tests which show the "Marque Speciale" cement to have a high sand-carrying capacity. In short, as much as two or three times the usual proportion of sand can be used, and the same result achieved as with ordinary portland cement and sand.

Not Costly to Install

The writer made some inquiries as to the cost of installation of a plant for the manufacture of "Marque Speciale" port-

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Result of tests of a sample of cement sent in a hermetically sealed iron drum from Switzerland:

A. CRUSHING STRENGTH PER SQUARE INCH

Cubes of neat cement, and also composed of three parts of standard sand to one of cement by weight, gauged and treated in an exactly similar manner to the briquettes, were tested for crushing strength with the following results:

1. Neat Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 crushed at 5630	No. 7 crushed at 8795	No. 13 crushed at 9324
No. 2 crushed at 6333	No. 8 crushed at 9324	No. 14 crushed at 9500
No. 3 crushed at 7739	No. 9 crushed at 8443	No. 15 crushed at 9676
No. 4 crushed at 7917	No. 10 crushed at 8621	No. 16 crushed at 9412
No. 5 crushed at 7037	No. 11 crushed at 8795	No. 17 crushed at 8796
No. 6 crushed at 7037	No. 12 crushed at 8443	No. 18 crushed at 9850
Mean.....6949	Mean.....8737	Mean.....9426

2. Three Parts Standard Sand, One Part Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 crushed at 2638	No. 7 crushed at 4222	No. 13 crushed at 6861
No. 2 crushed at 3518	No. 8 crushed at 4046	No. 14 crushed at 5803
No. 3 crushed at 2990	No. 9 crushed at 4574	No. 15 crushed at 6333
No. 4 crushed at 3518	No. 10 crushed at 4926	No. 16 crushed at 6333
No. 5 crushed at 2990	No. 11 crushed at 4222	No. 17 crushed at 6333
No. 6 crushed at 3518	No. 12 crushed at 4574	No. 18 crushed at 7739
Mean.....3195	Mean.....4427	Mean.....6507

B. TENSILE STRENGTH PER SQUARE INCH

Water used for gauging 20.14 per cent. Briquettes placed in water 24 hours after gauging. Strain applied at the rate of 100 lbs. in 12 seconds in a Standard Testing Machine:

1. Neat Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 broke at 820	No. 7 broke at 850	No. 13 broke at 875
No. 2 broke at 810	No. 8 broke at 870	No. 14 broke at 860
No. 3 broke at 830	No. 9 broke at 815	No. 15 broke at 870
No. 4 broke at 840	No. 10 broke at 880	No. 16 broke at 880
No. 5 broke at 835	No. 11 broke at 840	No. 17 broke at 890
No. 6 broke at 820	No. 12 broke at 910	No. 18 broke at 910
Mean.....826	Mean.....860	Mean.....880

2. Three Parts Standard Sand One Part Cement

3 days—lbs./in².	7 days—lbs./in².	28 days—lbs./in².
No. 1 broke at 440	No. 7 broke at 510	No. 13 broke at 540
No. 2 broke at 430	No. 8 broke at 530	No. 14 broke at 540
No. 3 broke at 380	No. 9 broke at 500	No. 15 broke at 550
No. 4 broke at 390	No. 10 broke at 490	No. 16 broke at 510
No. 5 broke at 395	No. 11 broke at 515	No. 17 broke at 570
No. 6 broke at 410	No. 12 broke at 525	No. 18 broke at 550
Mean.....407	Mean.....512	Mean.....543

Fineness
Residue when sifted through a No. 180 x 180 sieve, 2.5 per cent.
Residue when sifted through a No. 76 x 76 sieve, nil.

Specific Gravity
3.082.

Setting Properties
Initial, 1¼ hours. Final, 5 hours.

Soundness
By Chatelier method—After 24 hours aeration, 0 millimeter. After 7 days aeration, 0 millimeter.

Hydraulic Modulus
2.75.

Chemical Analysis

Water, Carbonis Anhydride	3.30
Insoluble Residue	.79
Silica	19.53
Alumina	7.38
Oxide of Iron	2.20
Lime	61.40
Magnesia	1.95
Sulphuric Anhydride	2.57
Alkalies and loss	.88
	100.00

land cement and was surprised to find that the cost of installation does not exceed that of a plant for the same output for the manufacture of ordinary portland cement. The Holderbank factory was completely erected, equipped and commenced on a capital of 3,600,000 francs. The price would be much more today, but this applies to everything else. Before the war a factory for the manufacture of ordinary portland cement would have cost about the same erected in the same place and designed for the same output.

Uniform Quality

Another advantage the manufacturers at Holderbank have been able to show is that their cement has a remarkable invariability of quality. As those connected with the industry well know, it is most difficult to keep the quality of the cement the same at all times and at all periods of the year. This result has been achieved and it seems to make no difference as to when the cement is taken or from what part of the silo it comes, the quality is precisely the same.

There is an old-fashioned school of engineers who state that they would rather see a slow growth in the strength of the cement over a long period rather than one which is prompt. They do not like anything which would tend to accelerate this growth, and they represent that conservative element in industry which always fights against new methods and new productions.

This seems to be a very foolish attitude to assume. For example, when buying a chair, we should experience a shock if told that although a very good chair, special care must be taken of it for the first few days as the material had not yet had time to assume its proper strength. How much better to be able to use it at once, and to be assured that the cement we buy will gain its strength almost at once.

Of course the setting time can be regulated according to specification to quick, medium or slow, and once again the writer would emphasize the fact that this has nothing whatever to do with the rapid growth of strength. Let there be no confusion on this point, as the cement may be slow setting and yet gain its strength in the first three or four days, as indicated by the tests.

In conclusion, the writer ventures to express the opinion that the methods used in the Holderbank factory and the quality of the product turned out will revolutionize the cement industry when the facts are more widely known. It is not the intention of the manufacturers to hide their light under a bushel, but they wish to profit by their years of research, and to place before others the advantages of their experience, and the writer understands that it will not be long before these new methods are introduced in various parts of the world. It is certain that this will result in great benefit to all portland cement users. They will be able to purchase a cheaper cement of unrivalled quality. In this country (Great Britain) the price of cement is such that engineers will use it only when they are obliged to do so, and fresh impetus will be given to the industry when a cheaper and better cement is launched on the market.

A new era in the portland cement industry has dawned, and a new process for the manufacture has been discovered. It will happen as always happens when something newer and better is evolved, and the old factories in England and elsewhere, unless they introduce the new methods and improved machinery, will now be obliged to shut their doors for good and all and give place to more modern practice.

Flowability of Concrete Is Increased by "Over-Sanding"

DURING THE PAST MONTH, several series of tests of concretes made from Potomac River sand and gravel have been carried out by the United State Bureau of Standards, using various proportions of cement to aggregate from 1:1½:3 to 1:3:6 and with the extremes of flowability used in practical concrete construction work. The results of these tests emphasize a feature of considerable importance to the contractor. When aggregates are proportioned by volume measure, as is customary on most construction work, it is found that the use of wet aggregates requires ½ to 1 bag more cement per cubic yard of concrete than do dry aggregates.

Sand is generally wet or at least moist when used, so that the full difference may never be apparent in field practice, yet the use of sand from a pile which has just been exposed to rain will result in the employment of more cement for a given volume of concrete than would have been the case had the work been done on a dry day. The excess strength resulting from the increase in cement is unnecessary providing that designed strengths were obtained with the drier materials.

As above mentioned, this increased quantity of cement may be as high as one bag per cubic yard of concrete, and the increase in strength, due to the added cement in a cubic yard of concrete made with wet aggregates is roughly proportional to the increase in cement. Therefore, if there is a marked increase at any time in the moisture carried by the sand, the tendency on the job should be to use larger volumes of sand in the batch.

Marked improvement in the working qualities of the concrete will be noted under usual conditions when the relative volume of sand is increased and the gravel proportionately reduced. With well graded river sand and gravel, such as is available in the District of Columbia, the "over-sanding" may be beneficial up to the point where the volume of sand in the batch is equal to the volume of the gravel. Such concrete will not segregate for maximum flowability commonly used in construction work; it will be easier working, the quantity of cement required per cubic yard will be slightly less and there will be no reduction in compressive strength.

Potash Deposits of Alsace

THE POTASH DEPOSITS of Alsace lie beneath an open stretch of the valley of the Rhine in southern Upper Alsace, about 25 miles north of the Swiss border. No evidence of either the potash or of the large masses of common salt that are associated with it is found at the surface; the potash was discovered only by borings put down in search of coal. Under the German rule a large part of the potash field was owned and operated by the great potash monopoly, the German Kali Syndikat. All the potash properties in this region are now in the hands of representatives of the French Government.

The potash deposits lie at depths ranging from 1,200 to 2,200 feet below the surface, in two beds, one about 60 feet below the other, which are mined through concrete lined shafts, somewhat as coal is mined. The appearance of the deposits in places is striking. They present high walls of sparkling crystalline salts, banded in nearly horizontal more or less wavy stripes of red and white, resembling a part of an immense flag. Much of the crude material is used for fertilizer after crushing only.

Cement Production in Spain

THERE ARE SOME 12 BRANDS of cement produced in Spain, the leading ones being "Asland," "Cangrejo," "Ancora-Rezola," and "Hercules." The principal centers of cement production are Barcelona and Bilbao. The leading Spanish company is the "Compania General de Asfaltos y Portland 'Asland,'" which is responsible for 40 per cent of the Spanish production, operating three large plants, and capitalized at 14,000,000 pesetas ($2,700,000 at normal rate of exchange). In 1919 this company produced and sold in Spain 86,134 metric tons of cement.

It is stated that this company is not producing more than half the capacity of its plants, so that it is evident that the normally growing market for cement in Spain will be met without recourse to importation.

Preparation of Silica Products

National Silica Company, Oregon, Illinois, Has Modern Plant With Specially Designed Equipment Throughout

THE MANUFACTURE of silica sand and dust for pottery, glass, silicate of soda, mill and foundry sands, is a process that involves the quarrying of the rock, washing, drying, screening, and pulverizing. Practice in these processes varies considerably in different silica producing localities. The recent additions to the plant of the National Silica Co., of Oregon, Ill., has placed this producer in the foremost rank of the silica sand industry.

Quarry Methods

The silica rock found at Oregon is beautifully white in color, although there is occasionally a yellow tinge to it. It disintegrates very readily into sand particles, needing only a blow from a sledge hammer, and because of this fact, the quarrying operations are very simple. The drilling is done by means of an electric well drill, and dynamite is used for blasting. The stripping is done by a steam shovel with a 2-yd. dipper.

On blasting the rock granulates 80%, leaving 20% of irregular chunks of material. The chunks and fine material are loaded into 4 yd. 36-in. gage railway cars, by the steam shovel.

The material crushes very easily except when frozen during the winter, and because of this and its abrasive qualities a 24x48-in. roll crusher is used. On leaving the roll crusher, the material flows by gravity into a caterpillar feeder and onto a belt conveyor, which takes it to a concrete storage house having a capacity of 6,000 tons. This feature, together with the storage of finished sand and sand in process, amounting to 11,000 tons, makes the plant independent of the quarry for eight to ten day periods.

Washing and Grinding

The sand is emptied from the storage bin into a battery of three grinding and washing pans by means of a nozzle and a stream of water directed toward the chute's opening, from the opposite side of the bin.

The grinding and washing mill combines these two operations, and it also removes all of the bond and dirt contained in the sand. The water is forced into the machine through nozzles upon inclined screen plates at such an angle as to wash the rejected particules off the screen down under heavy rolls, traveling on the revolving pan bottom. Here it is again ground by the rolls, while the surplus water with the finely ground particles passes through the screen openings, dropping into a stationary hopper.

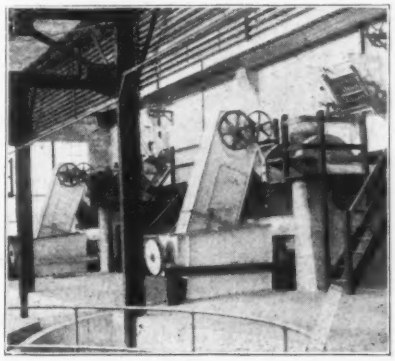
This mixture of sand and water in turn feeds into a rescreening system. If the sand is fine enough, it goes through this second screen, and into a system of chutes which lead into two concrete cisterns having a combined capacity of 1,200 tons. The tailings or ungranulated rocks are carried automatically to an elevator shown in one of the views. The elevator carries the sand back to the grinding and washing pan, and the process is repeated.

At the bottom of the concrete cisterns are 12-in. pipes through which the sand is washed into another narrow rectangular cistern. A scrubber belt is placed in this pit, and it carries the sand up to a battery of five double-screw washing and separating machines.

The scrubber belt is merely a conveyor belt with pieces of 2x4-in. wood nailed to the belt about 1 ft. apart. This works in a trough and carries both sand and water to a system of chutes, leading to the washing and separating machines.

The sand is washed into the tank of the screw washer, where the body of water is sufficiently large to nullify the current, and the sand settles around the screw flights, which carry it up the incline and empty it upon a conveyor belt, which carries the sand into a round building, where formerly all the crushing, washing and drying was done.

This round building is now used only for the final washing, draining and drying of the sand. In this building is a battery of old washing and separating machines, and the conveyor belt empties the sand into another system of chutes leading to this battery of machines. The sand is stored from these machines in piles upon the drain floor.



View of mills and elevators

Under this floor is a system of open joint tile drains covered with 4 ft. of gravel, through which the water seeps.

Drying the Sand

To recover the sand from these storage piles, a clam shell or grab bucket and traveling crane is used. This device transfers the damp sand very efficiently and quickly to the driers which occupy a portion of the building.

A steam dryer is used, and it consists of tiers of steam pipes through which the sand drops by gravity from a hopper on top. The openings decrease toward the bottom of the drier.

The company maintains its own power plant for heating the steam drier, through which 80 lbs. of steam is forced.

The hot sand as it comes from the drier is carried by a belt conveyor to an elevator pit, and is removed here by a bucket elevator which takes it to the top of the mill shown in one of the views. Here it is taken up by a belt conveyor and distributed to a battery of four "Newaygo" screens. The screens pass the sand to a belt conveyor, which carries it to the loading bins. This product is known as glass sand, and it is loaded into the cars by gravity.

The rejects from these screens are also taken up by a belt conveyor and carried to a coarser screen. From this screen the material is taken up by a belt conveyor, which deposits it in another loading bin.

This product is sold for sand blast, and is loaded into the cars by gravity also. This blast sand is used very extensively for cleaning steel, castings, automobile bodies, etc.

Although most of the silica sand is sold to glass factories, the company produces powdered sand, which is made by pulverizing silica sand. The product of this particular plant is used exclusively for pottery purposes.

For making the powdered sand the company has five pebble tube mills. The mills before use are lined with Belgian or flint block, and then filled with pebbles about the size of an egg. These pebbles are all imported from France. The mill is then filled with sand from a hopper above the mill, enough sand being used to fill the cracks between the pebbles, and the mill is revolved for a time necessary to give proper fineness to

the sand. It is then dumped through a screen or grating which takes care of the pebbles and the pulverized sand goes to a large concrete bin on the side of the mill.

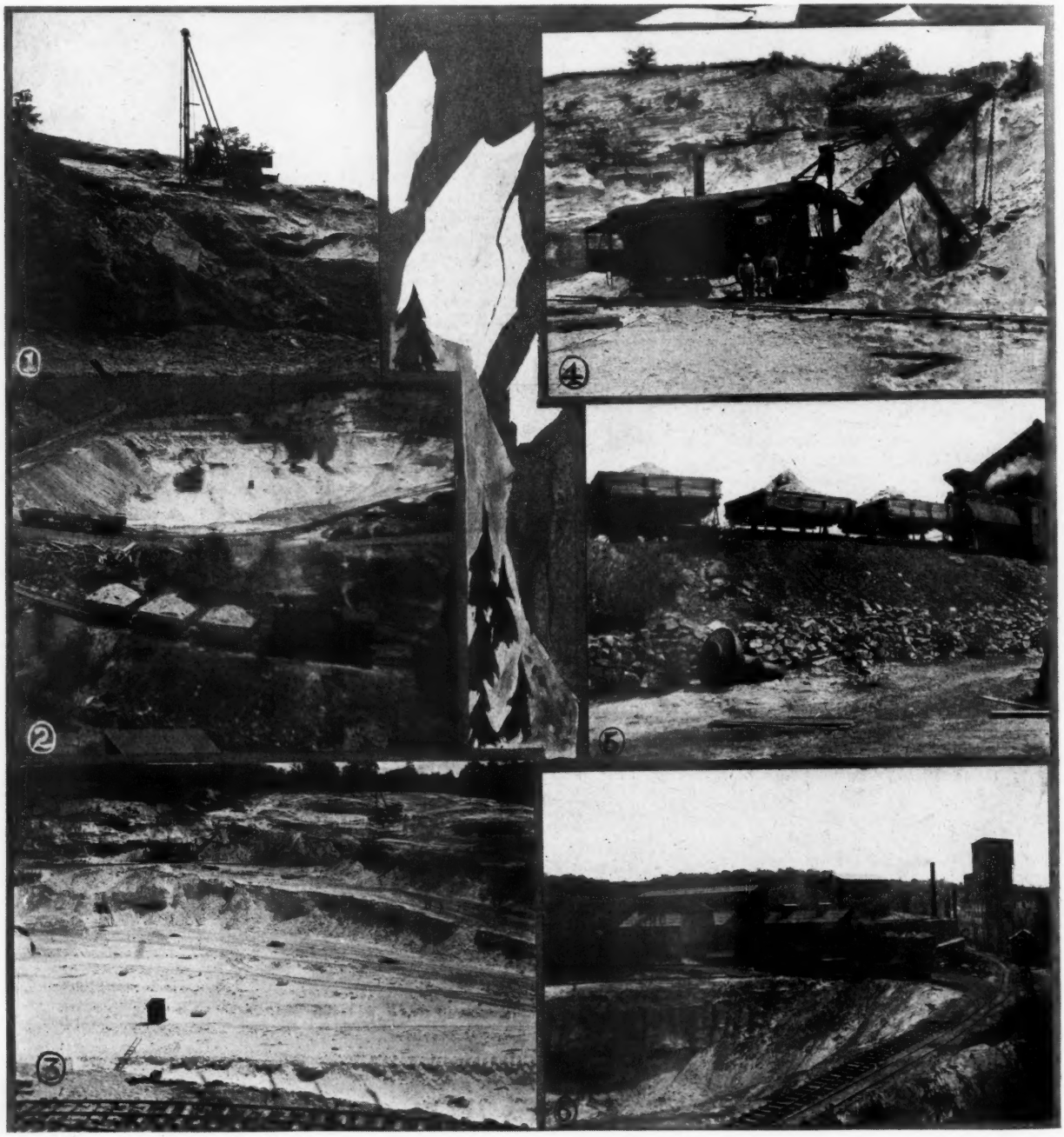
The pulverized sand is tested through a 140-mesh silk sieve, before allowing it to go to the bin. A clam shell bucket operating on a crane loads the pulverized sand into a hopper which leads to the cars. The cars before being loaded with pulverized sand as well as those loaded with glass sand must all be paper lined.

The pulverized sand is loaded on one side of the mill, and glass and blast sand on the other side. The company runs all of the machinery, excepting the steam drier, by electricity which is bought from the Illinois Northern Utilities Co.

Special Machinery

Practically all of the equipment used at this plant was designed and built for its purpose by W. G. Stevenson, general manager, who is also president of the Stevenson Co., of Wellesville, Ohio. This latter company acquired its original experience with clay-working machinery, and because of his dual position Mr. Stevenson has been able to work out in actual practice most of the problems of the silica sand industry along entirely original lines.

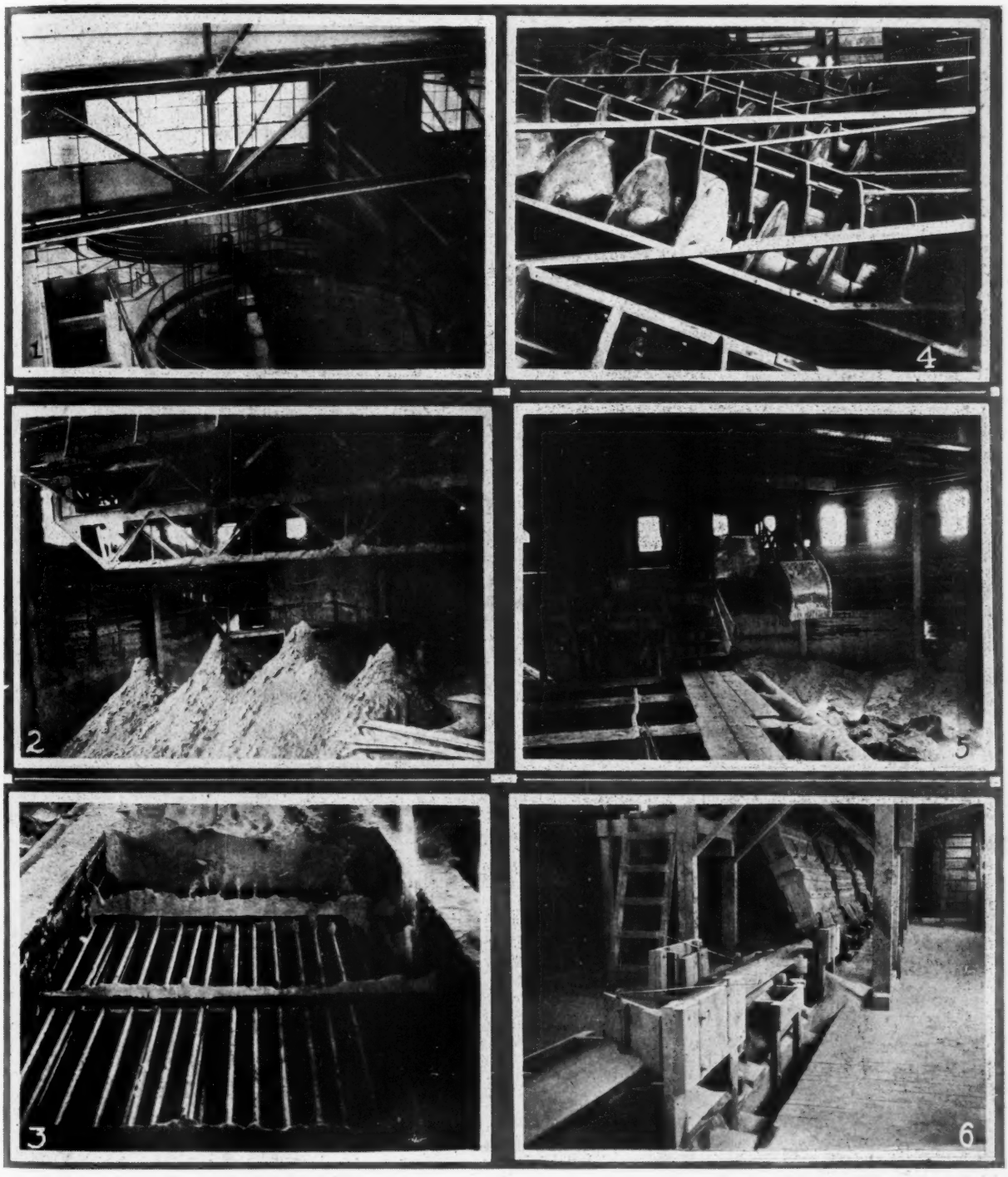
The officers of the company are: H. R. Holmes, president; A. G. Mason, vice-president; W. G. Stevenson, secretary-



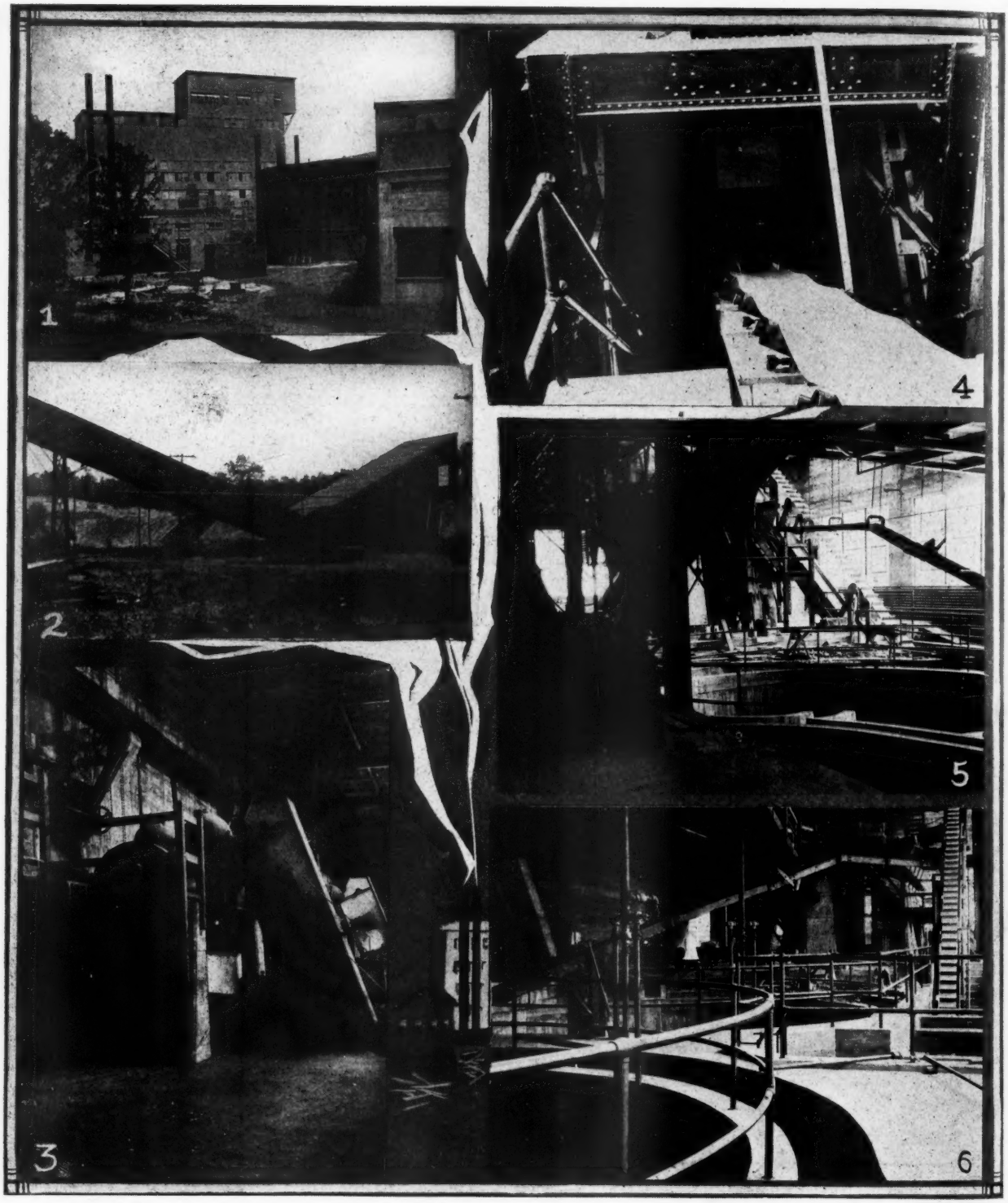
(1) View showing electric well drill; (2) Birds-eye view of quarry; (3) Quarry floor and several benches; (4) Steam shovel and quarry face; (5) Type of railway cars and dinkey; (5) View of plant of National Silica Co.

treasurer and general manager; F. T. Poger, superintendent, and J. F. Putnam, manager.

The company maintains a complete repair department, and employs six men steadily here. It also builds homes for its employees, and during the war conducted and maintained a school for the employees' children, and has since been instrumental in having a township school located and built on the property which was donated for the purpose.



(1) Top view showing cisterns. Note rectangular pit in lowe r left hand corner; (2) Sand draining as it comes from washers; (3) Sand drying on tiers of steam pipes; (4) Battery of screen washing and separating machines; (5) Clam shell bucket and traveling crane used to transfer sand to dryers; (6) Chutes from screens and belt conveyor



(1) View showing washing and drying house and mill, transformer unit and power house in center; (2) Concrete housing over initial crusher and belt conveyor to storage bins; (3) Grinding and washing pan, showing elevator in front; (4) Caterpillar (apron) feeder from crusher, and belt conveyor to storage bins; (5 and 6) Views showing concrete cisterns and scrubber belt—Note steel construction of building

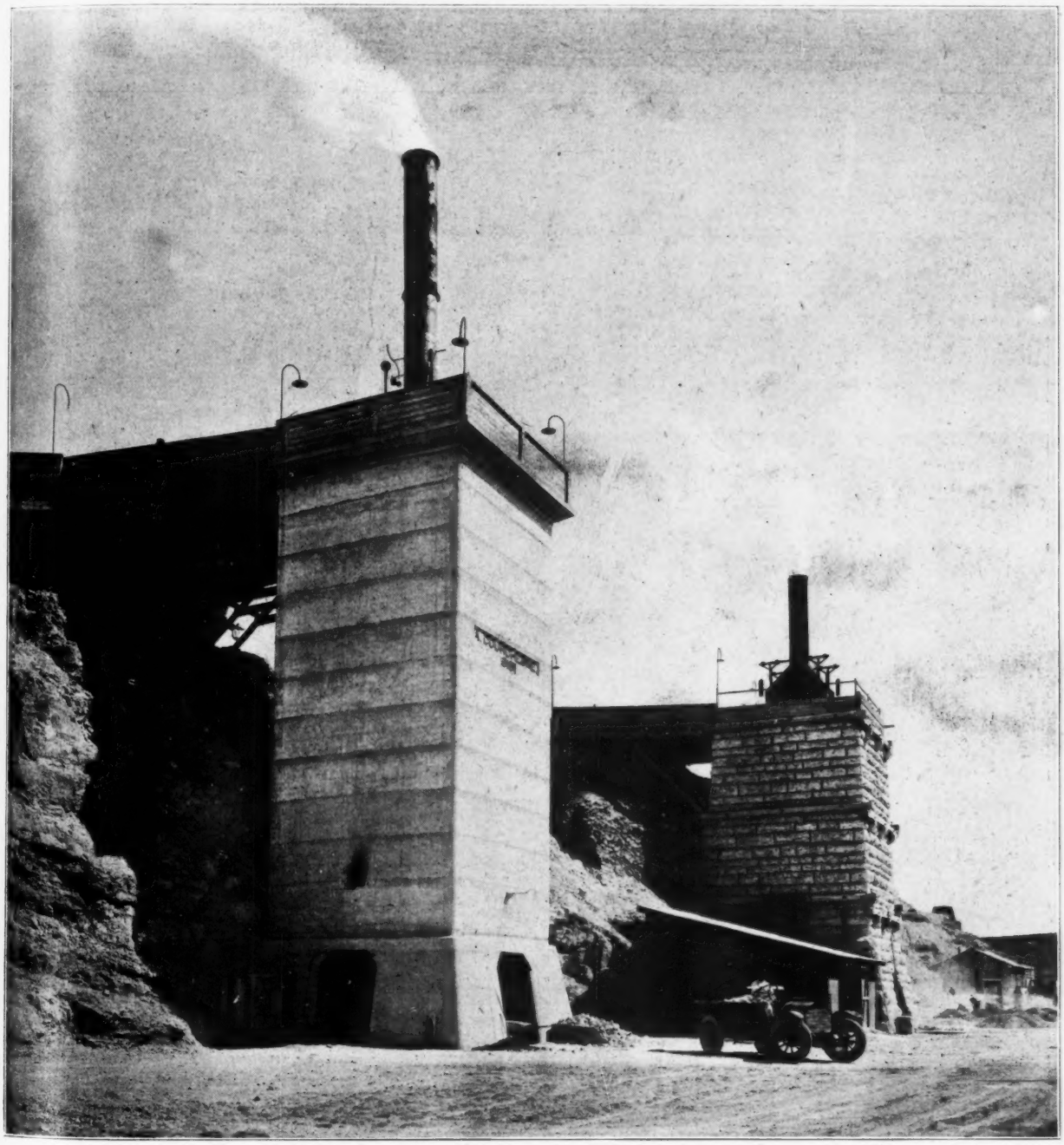
Modern Concrete, Pot Lime-Kiln

Oldest Type of Lime Kiln With Modern Improvements Still Has Field of Usefulness —The Courchesne Kiln at El Paso, Texas

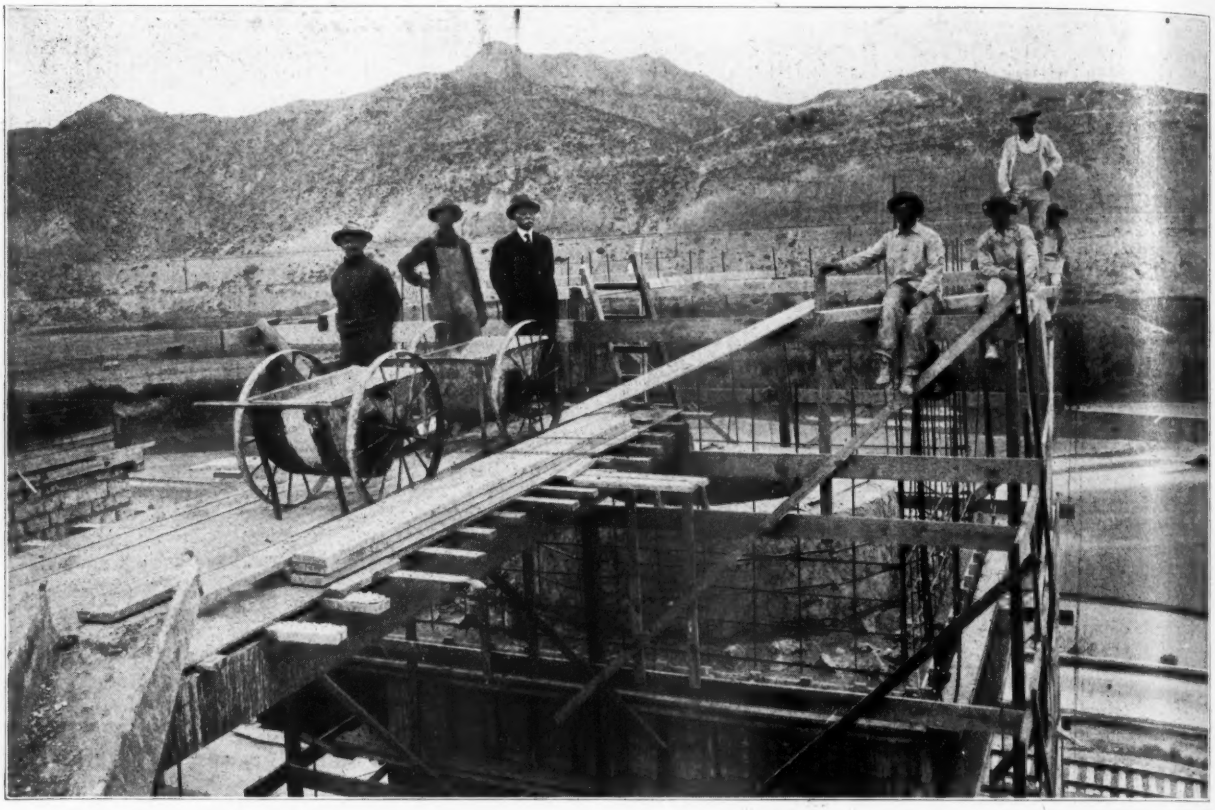
LIME BURNING is an industry at least 4,000 years old. During that period there have been only four marked steps of development or progress from the very crudest conceivable method of putting chunks of limestone in an open fire.

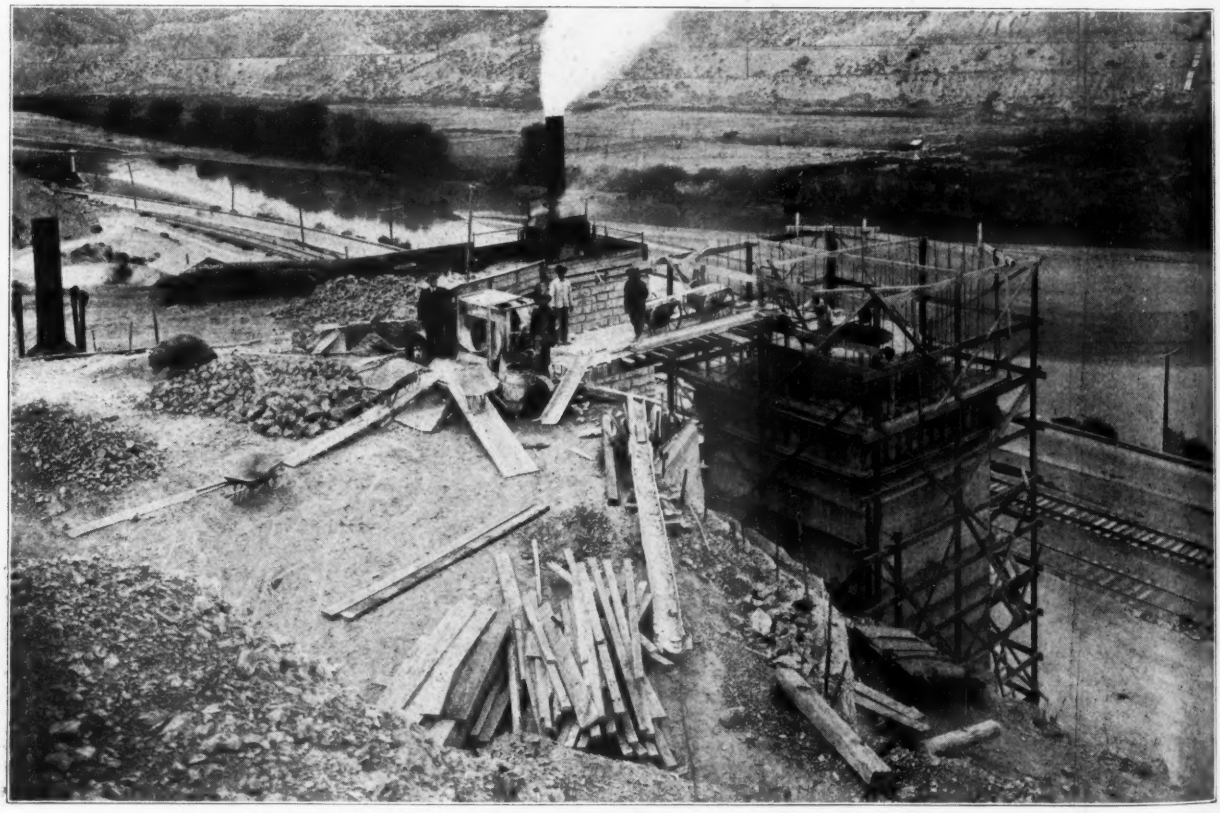
The first was the construction of temporary kilns, or piles of the limestone to be burned, with a proper proportion and distribution of fuel in the pile. Even this crude method still has its use and is in existence among farmers who make their own lime.

The second step was the construction of permanent kilns, which are either shafts



New and old kilns of A. Courchesne, Inc., El Paso, Tex.





Construction views of the Courchesne reinforced-concrete lime kiln at El Paso. Mr. Courchesne in the center of the upper view; Rio Grande and Mexican shore in the background

hollowed out of the limestone ledge, or shafts made of blocks of limestone laid up in lime mortar. These kilns are fed with alternate layers of limestone and fuel. This is the pot kiln and was the type universally used in this country until within the last few decades. It still has certain advantages and no doubt will continue to be used in certain localities and under certain conditions. The kiln described herewith is probably the highest development of the pot kiln yet reached.

The third step in lime burning progress was the development of the shaft kiln with separate furnaces, where the fuel does not come in contact with the limestone—the type of kiln in general use today. The fourth step is the rotary kiln, which while having many big advantages, yet has certain disadvantages for the average lime plant that will undoubtedly always prevent its universal adoption.

Reasons for a Pot Kiln

There are a number of reasons why experienced lime burners still favor pot kilns under certain conditions. There are some kinds of limestone that are very difficult or practically impossible to burn in any other kind of a shaft kiln. For instance, there are stones which tend to "explode" in the burning, or free the carbon dioxide gas with such violence as to shatter the lime and stop up the draft in the kiln. The stone burned by the A. & C. Lime Co., near Canton, Ohio, is an example. Some California lime plants, as will be described in a later issue, have to deal with a very coarse crystalline stone, which crumbles so badly in the burning that ordinary shaft kilns cannot be used, although this stone will burn beautifully in a rotary kiln.

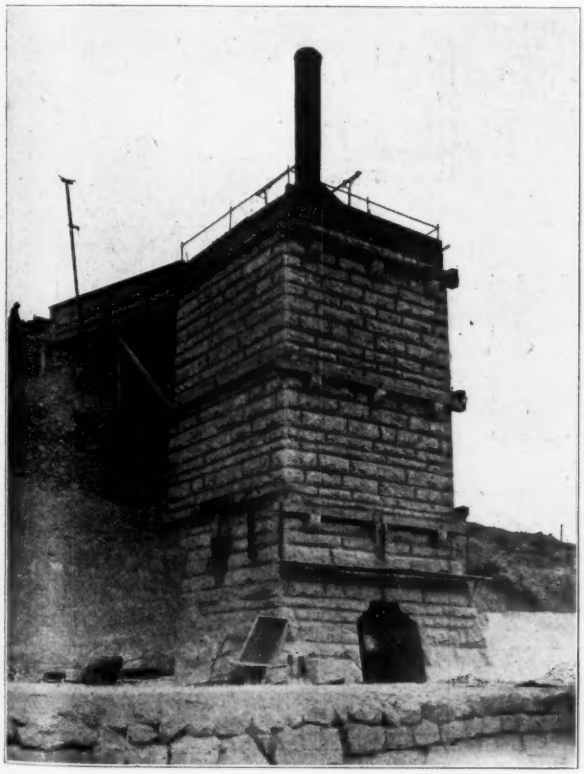
Labor conditions may be such that it is cheaper to operate a pot kiln and pick over the lime by hand to remove the ashes than to obtain the much higher skilled labor necessary to operate a modern separate-fired shaft kiln economically. This and the fuel economy that the pot type of kiln has always enjoyed as compared with the average separate-fired shaft kiln are no doubt among the factors which determined the selection of the kiln to be described.

Modern Pot Kiln

The accompanying views and drawings are so complete that a lengthy description of the new kiln designed and erected by A. Courchesne (Inc.), El Paso, Tex., is not necessary. For these we are indebted to Mr. Courchesne, who is proprietor of the El Paso Limestone Quarries and also a vice-president of the Southwestern Portland Cement Co., whose El Paso plant adjoins his property. Associated with Mr. Courchesne in the lime and quarry business is W. H. Winter, vice-president, and T. A. Courchesne, a son, who is secretary and treasurer.

The new concrete kiln, the details of which are given, is the outgrowth of Mr. Courchesne's 22 years' experience with a kiln of somewhat similar design, built of blocks of limestone. This older kiln is of rectangular cross-section, 6 by 8 ft. The

Side doors in stack for feeding coal and limestone-damper for draft control. Note electric lights for use of the night shift



Original Courchesne lime kiln at El Paso; lined on an average of once in four years

Construction view of new reinforced-concrete kiln, north of the original kiln

concrete kiln was made round on the theory that this cross-section would be easier on the lining, although the older kiln has been lined only on an average of once in four years. This matter of economy in lining was also a determining factor in the decision to stick to the pot type of kiln in this instance.

On this point T. A. Courchesne says: "Since our kilns have no side furnaces to burn out we have there an added advantage which we believe to be this: Our entire lining rests on a solid foundation, no part rests on top of arches or frail 6 by 8-in. firebrick pillars supporting these arches. When in the side burning kilns the arches burn and drop, the entire lining is loosened up, thus disjointing the same and allowing the fire to attack the brick on all sides (face and all round). This naturally cuts down the life of the lining very rapidly. On the other hand, nothing can loosen our lining,, as there is nothing to drop from under the lining. This is chiefly the secret of the long life of the lining. And when it is considered that a relining (with the cooling and reheating which costs money, aside from loss of business, and a lot of core for about a week after starting) costs at least $1,000 to $1,500, it is a worthwhile thing to stave it off as long as possible. Of course, our style of kiln has its disadvantages, too, but in the matter of lining and fuel economy we think it is entirely satisfactory."

Adobe-Brick Insulation

One feature which is partly responsible for the long life of the lining is that the method of construction provides excellent insulation against loss of heat by radiation through the lining and shell. The kiln from the inside outward is constructed as follows:

1. Standard firebrick laid endways on edge.
2. Common brick—4-in. course.
3. Coal ashes—2-in. course.
4. Adobe (sun-baked mud brick)—12 in. course.
5. Reinforced-concrete shell or casing (containing 10 per cent lime putty as a substitute for lime hydrate).

The coal ashes are used as a cushion to relieve the strains caused by the expansion and contraction of the brick lining.

The adobe brick were laid in 4-ft. stages and given a cement-lime plaster coating, so as to waterproof the exterior, and were then used as the inside form for the concrete shell.

Operation of Kilns

The kilns are operated in two five-hour shifts. One man feeds coal and rock in the right proportions at the top of the kiln, while another draws lime at the bottom. These men work only from 6 a. m. to 11 a. m. and from 4 p. m. to 9 p. m. All the rest of the 24 hours of the day the kilns require no tenders.

When production of lime has exceeded the demand, the kiln has gone as long as 24 hours without attention, and has been started up again without relighting the fires or emptying the kiln. There was enough heat retained by the thick walls to ignite the new charge.

The kiln bases are built against the hill and have three openings. The lime is drawn toward the front opening and is discharged from the kiln over a bar grizzly, which removes most of the fine lime and ashes. The lump lime comes down upon a steel loading table and is pushed into wheelbarrows and loaded into box cars in bulk.

When car service was regular, owing to the dry climate, a lime house or shed between the drawing floor of the lime kiln and the car-loading track was not necessary, but one has been built recently, and it is now planned to erect a large warehouse and hydrating plant between the two kilns and the railway track.

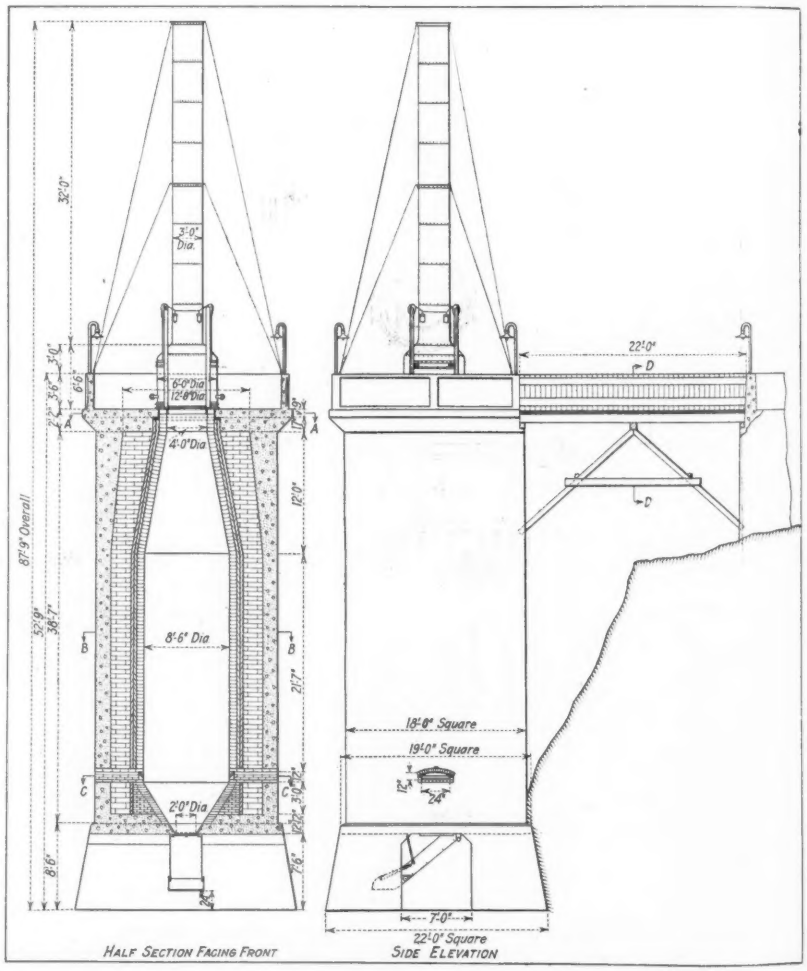
The hydrating plant will consist of a Clyde hydrator, a Sturdevant crusher and a Raymond mill and air separation system. This will have a daily capacity of about 40 tons per day and will be in operation in about three months. It is also expected to add another kiln in about a year. The addition of the hydrating plant and air-separation system will permit the use of much fine lime, which, because of its ash impurities has not before been utilized.

The capacity of the older kiln is 10 tons per day and of the new one 15 tons. The fuel consumption is 1 part of coal to 8 parts of stone, or 1 part of fuel to 4 parts of burned lime. Egg or nut size bituminous coal containing about 14,000 B.t.u. is used (has about 10 per cent ash).

The new reinforced-concrete kiln, which was completed about six months ago, cost $9,000 and required about three months to build.

Quarry Operation

The quarry is in the well-known limestone formation north of El Paso on the bank of the Rio Grande. It is on the hillside behind and above the two kilns. Both high calcium and magnesium limestone are found in the same deposit. The stone is hand loaded into motor trucks, which come out



Longitudinal section and elevation of the new reinforced-concrete kiln, designed by Messrs. Courchesne and E. A. Fortier

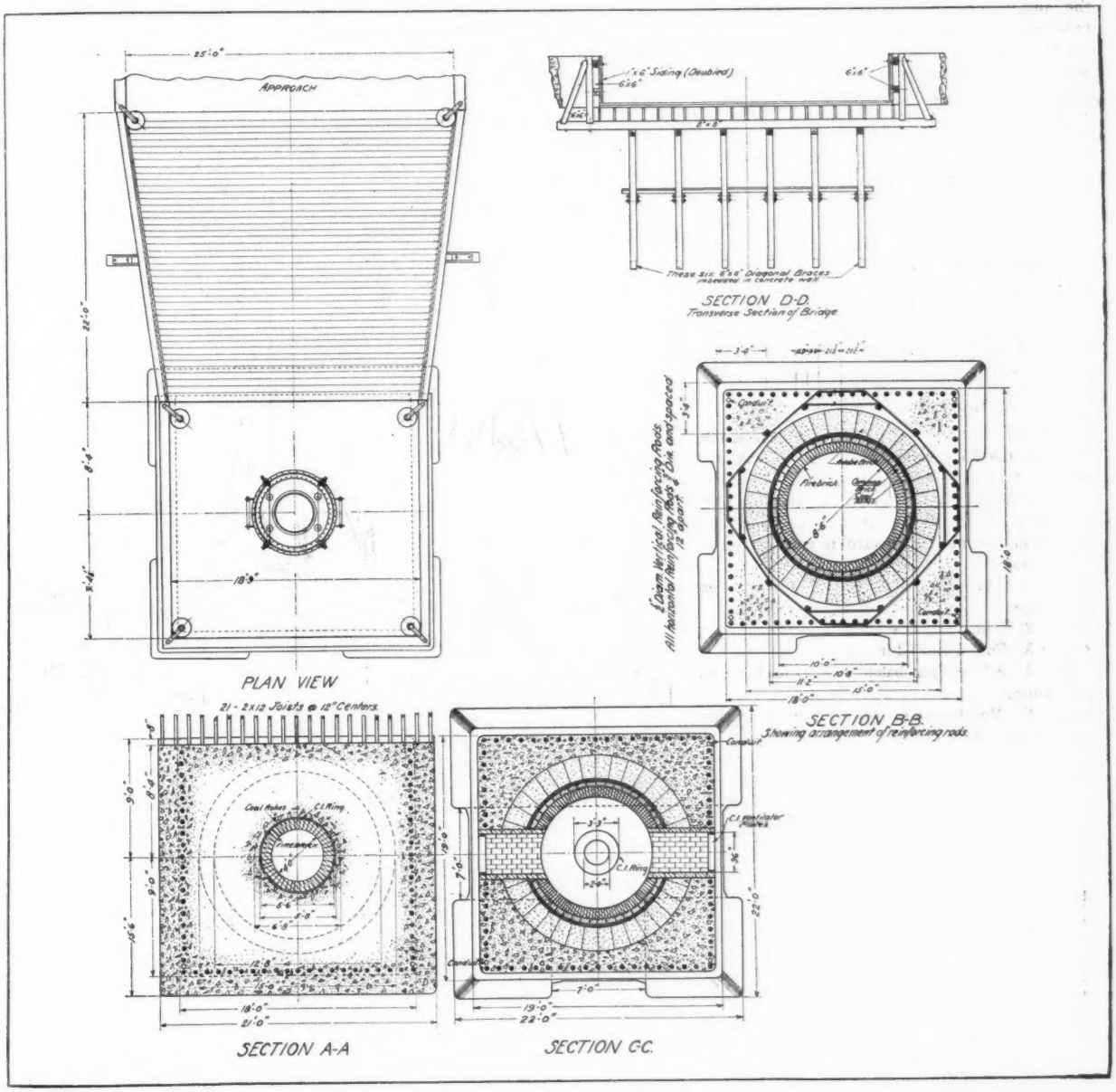
of the quarry and down to the lime plant on smooth, winding roadways.

Gypsum Land Plaster Not a Competitor of Lime

GYPSUM IS NOT a substitute for agricultural lime, although the two are closely inter-related in some of their effects. Gypsum has its main value in furnishing the crop sulphur and is therefore best used on crops of relatively high sulphur requirement. Lime has its main value in neutralizing the acidity of soils. In some of their secondary effects, no doubt, these substances act in somewhat the same way. Both furnish calcium. No doubt both will precipitate iron and aluminun in acid soils where these are so soluble as to be injurious. Gypsum furnishes sulphur directly to the plant while lime hastens the availability of the organic sulphur of the soil by hastening the decay of organic matter and by hastening sulphofication. The continued substitution of one for the other will ultimately lead to excessive acidity on one hand or exhaustion of sulphur on the other hand. Some limestones bear as much as five-tenths per cent of sulphur. Others contain none. Some gypsums contain 17 per cent of calcium and magnesium carbonates. Others contain less than one per cent.—Dr. William Crocker, Gypsum Industries Association.

Lime Helps Oats and Corn

RESULTS FROM LIMING on the Mat McKinney farm in Randolph County, Missouri, have been so gratifying that a 60-ton car of ground limestone has been ordered to extend the limed portion of the same farm. In a field partly limed the oats on the limed portion were decidedly better than where no lime was applied and were about four days earlier in ripening. A test plot in a corn field also shows a better stand, better color and much more luxuriant growth where lime is applied.—"Farm News Service" of the University of Missouri College of Agriculture.



Structural details of the Courchesne improved, continuous-fired pot lime kiln. Cross-sections corresponding to planes shown on longitudinal section on opposite page

Practical Chemistry for Lime and Cement Manufacturers

IX—Nitrogen and Air—Air Nitrates—Cyanamid and Relation to Lime Industry

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, 11-13 E. Fayette St., Baltimore, Md.

NITROGEN IS THE CHIEF CONSTITUENT of the air but not the most active. It is the opposite of oxygen and is very inert or has a feeble chemical affinity for other elements. In the air, it serves to dilute the oxygen, otherwise the oxygen would combine too rapidly with the other elements and not only would a fire once started be almost impossible to extinguish but our lives would be short.

Nitrogen is found in nature uncombined with other elements, or as the chemist says, "free" in the air, of which it forms nearly four-fifths by volume. It is also found in abundance in combination with other elements. Among its most important compounds are the nitrates and the salts of ammonia. It is present in many animal substances such as blood, muscular and nerve tissue, urine, albuminoid substances, etc. The compounds of nitrogen play a most important and unique part in industrial chemistry. Some of them are most beautiful dyes, some are powerful explosives and others are very useful drugs. Nitrogen is not found so abundantly in the vegetable kingdom and yet it is essential to plants and its compounds are important fertilizers.

Nitrogen is a tasteless, colorless, odorless gas. It is a little lighter than air, its density compared with air being 0.97. Its atomic weight is 14 and molecular weight 28.

The most important chemical property of nitrogen is a negative one—its inertness or lack of chemical affinity. It will, however, at high temperatures combine with other elements—lithium and magnesium for example will burn in an atmosphere of nitrogen, if heated to a high temperature, and if an electric spark is passed through a mixture of oxygen and nitrogen, the elements unite to form nitrogen trioxide, N_2O_3.

Preparation of Nitrogen

Nitrogen is prepared by heating ammonium nitrite. This salt when heated gives up its nitrogen according to the reaction.

$$NH_4NO_2 = 2H_2O + N_2$$

Ammonium nitrite is a very changeable salt, however, and can not be kept well, consequently nitrogen is best prepared by heating a mixture of chemicals which form ammonium nitrite, such as sodium nitrite and ammonium chloride. Thus

$$NaNO_2 + NH_4Cl = NH_4NO_2 + NaCl$$

The ammonium nitrate so formed is then decomposed into nitrogen and water as above.

Ammonia

Of the compounds of nitrogen, ammonia is a combination with hydrogen, NH_3, and is a colorless gas having a pungent odor familiar to every one. This gas is very soluble in water. Aqua ammonia popularly called "ammonia" is a solution of ammonia gas in water. We usually consider this solution as having the symbol NH_4OH and it is caustic like other hydrates. The gas may be considered as reacting with water just as lime does to form a hydrate.

$$NH_3 + H_2O = NH_4OH$$

Ammonia acts as a base and forms a series of salts of which ammonium chloride, NH_4Cl is one of the most important. Thus

$$NH_3 + HCl = NH_4Cl$$

Ammonia is prepared in the laboratory by heating together a mixture of ammonium chloride and lime, thus,

$$2NH_4Cl + CaO = CaCl_2 + H_2O + 2NH_3$$

The principal source of ammonia today is from the "gas water" of gas works and from by-product coke ovens. In both instances it comes originally from the coal which contains nitrogen. The ammoniacal liquors are distilled with lime when the ammonia is given off.

Nitric Acid

Nitric acid, HNO_3, is composed of hydrogen, oxygen and nitrogen. It is made by heating sodium nitrate with sulphuric acid and condensing the vapors which are given off, thus

$$NaNO_3 + H_2SO_4 = NaHSO_4 + HNO_3$$

It is a strong acid and unites with bases and form salts called nitrates. The chief of these are potassium nitrate, also called "nitre" or "salt-petre," KNO_3, and sodium nitrate, called "Chile salt petre," $NaNO_3$. There are immense deposits of the latter salt in Chile and this country is the principal source of nitrates for the United States. Until a few years ago Chile was almost the only source of nitrates. Now large quantities are produced from the air by several processes. It is said that Germany delayed making war on England until she had perfected process which would make her independent of imports from Chile, which source was of course bound to be cut off by the British navy.

Nitrates from the Air—Relation to Lime Industry

For many years man has been trying to produce nitrates and other nitrogen compounds from the air and thus break the Chilean monopoly. The fact that nitrates are produced during an electric storm and can also be made in the laboratory by passing an electric spark through the two gases led many chemists to tackle the problem. Within the last ten years, marked progress has been made in the fixation of nitrogen, as the problem is called, so much so that Germany could engage in war with nitrates obtained solely from the air. The solution of the problem of making nitrogen compounds from the air is so intimately connected with the lime industry that I may be pardoned for describing some of the processes employed. In the making of nearly all compounds so far produced lime plays some part.

In the older process, that of Birkeland and Eyde, a current of air is passed through a special form of electric arc which causes the oxygen and nitrogen to unite. The gases containing about 1 to 1½% nitric oxide, NO, are cooled rapidly under boilers. The gases also contain considerable excess air as only a very small percentage of this has been converted to nitric oxide. The latter on cooling combines with the oxygen of the excess air forming nitrogen tetroxide NO_2. The gas containing nitrogen tetroxide is then passed through towers where it is sprayed with water. This latter transforms it to nitric acid which in turn is neutralized with lime to form calcium nitrate. This latter compound can be used as a fertilizer or other nitrates and nitric acid may be made from it. Haber and others improved the furnace, etc., used so that more concentrated nitric oxide mixtures could be obtained from it and better operation generally could be secured.

Cyanamid

Frank and Caro found that when nitrogen is passed over heated calcium carbide the latter absorbs the nitrogen forming calcium cyanamid, $CaCN_2$, Calcium carbide, CaC_2, is prepared in turn by heating coke and lime in an electric furnace. The two reactions are as follows:

$$CaO+3C=CaC_2+CO$$
$$CaC_2+N_2=CaCN_2+C$$

In making cyanamid, the calcium carbide is first made and then powdered and the fine material charged into special electric furnaces where it is kept at about 1800°F. Pure dry nitrogen, prepared usually from liquid air is then passed over the hot carbide where it is absorbed forming the cyanamid. Commercial cyanamid contains usually about 20% nitrogen and is used directly as a fertilizer. Other important nitrogen compounds may be made from cyanamid, this if treated with superheated steam ammonia is formed according to the reaction.

$$CaCN_2+H_2O+CaCO_3=2NH_3$$

Or if treated with salt, sodium cyanide, an extremely valuable chemical is formed.

Calcium cyanamid or "cyanamide" is now made at Niagara Falls and other points throughout the world. The government had just completed when the Armistice was signed, a large plant at Muscle Shoals, Ala., to manufacture cyanamid and from this, other compounds of nitrogen.

(To be continued.)

Window Display of Household Rock Products

WE USUALLY think of sand, lime and gypsum "land plaster" in terms of tons, or at least in barrel quantities. And the average sand producer is generally glad to get $1 per ton for his product. Yet at least one progressive building supply dealer gets $1 per 100 lbs. or at the rate of $20 per ton for his sand.

How he does it is illustrated in the accompanying views of a window display of a Portland, Ore., building supply dealer—the P. L. Cherry Co. Clean Columbia River sand, which can be purchased at neighboring truck bins for less than $2 per ton, is here displayed in neatly tied burlap bags for $1 per hundred. The card reads:: "Yes, this is just sand; spade some in your flower bed and note the difference." There is another retail use for sand that might be similarly advertised and that is for children's play yards.

Other cards in this window read: "White wash your trees; They will appreciate it; enough lime for five trees, 25c." "This is garden lime; sweetens the soil and chases the weeds out of your lawns." The sign above is displayed over a pile of ground lime, which is sold in packages varying in size from 12 lbs. for 35c to 100 lbs. for $1.50.

Similarly on the left is a pile of ground gypsum rock or land plaster, with a card reading, "This is land plaster; get some for your lawn, garden and flower bed." This is sold in 10-lb. packages at 35c and in 80-lb. sacks for $1.25.

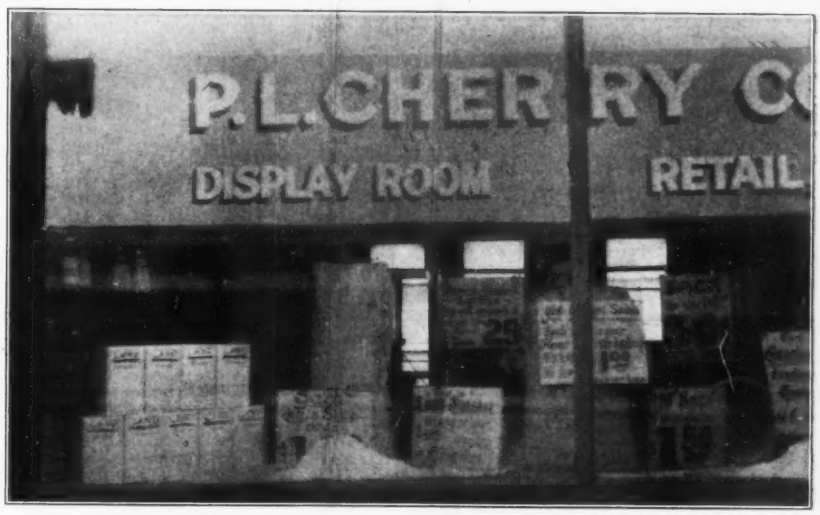
In this manner a considerable business has been developed by the enterprising dealer, in amounts that most building supply dealers would sniff at, but at very excellent profits, as the prices show, and in the aggregate a very appreciable amount of business.

The possibilities of developing this retail side of the rock products industry is limitless. Hardware stores, seed and poultry stores and similar mercantile establishments have only to be convinced of the market and the profit, before a very large demand might be built up.

Included in this line are of course rock phosphate and ground limestone for the garden, chicken grits and "canary-bird gravel"—which brings to mind the fact that one quarryman has developed a small but lucrative business in a mixture of ground magnesium limestone and bird food as a medicine to put "pep" into ailing canary birds.

Burnt or caustic lime in tight packages could be put to many household uses. It probably would serve most of the purposes of chloride of lime as a "deodorizer" without causing the very disagreeable odor of free chlorine.

Sand, lime and land plaster for the retail trade



A Portland, Ore., window display of rock products

Plan Doubled Production

Also Reduced Working Force and Greatly Increased Both Wages and Profits

By William S. Dutton

BY DEALING INTELLIGENTLY and squarely with labor, Fayette R. Plumb, Inc., Philadelphia tool manufacturers, have more than doubled production, reduced working hours and cut down the yearly turnover of the company's 500 workmen 75 per cent. By a system of representative government, combined with a series of welfare features, all unrest and discontent in the working force, two-fifths of which is foreign born, has been eliminated—striking evidence that there is a solution for the labor problem and that, when found, it checks present-day soaring costs.

"Our policy of a square deal to our workmen is the most important single factor in our success," says William D. Plumb, works and employment manager and brother of Fayette R. Plumb, the president of this company, which has factories in Philadelphia and St. Louis.

"There is no getting away from the fact that application of the Golden Rule to business is as essential to success as it is in our private lives.

"In handling labor problems, I endeavor to put myself in the place of the workman and look at things from his viewpoint. I have worked in every department of our factory, and so have my brothers, Fayette R. and Joseph H. Plumb, and we know what the workman is up against. When there is a doubt, the workman is given the benefit of it. Though it costs a little here and there to keep such a policy in effect, we are more than repaid in better work, more faithful employees, and a greater output."

Instruction for Foremen

Instruction of foremen and minor executives in the real principles of the business in which they are engaged, Mr. Plumb considers a vital force in the fight for increased production. When a workman understands that every minute he loafs and every time he spoils a piece of work he is not only cutting into the company's profits but his own prosperity, he begins paying stricter attention to bettering his work, says Mr. Plumb.

A large blue-print chart has been posted throughout the factory. It shows, in a way that each workman can understand, how a production of 3,000 tools per day means an income which is insufficient to pay the cost of materials and operation. It also shows, in contrast, how a production of 12,000 tools per day brings an income which pays all expenses, allows the company a fair profit, and leaves a wide margin for distribution in the form of wages.

Practical demonstrations having been given to show foremen how one lagging department in the factory will cut down the profits of the entire establishment as effectively as though every department were on a par with the lagging one. Workmen are shown why one defective tool sent to a customer places an obstacle not only into the path of the sales force, but in the path of the workman himself when he goes to draw his salary.

Three Forms of Bonuses

Three forms of bonuses have been introduced:

1. A "perfect work" bonus of 10 per cent. on all piece work rates, subject to deduction for careless work.

2. A monthly attendance bonus of 10 per cent., half of which is for not losing time, and the remainder for maintaining the standard of a good workman. *This bonus has reduced absenteeism from* 125 *workmen a day to* 13 *a day.*

3. A high cost of living bonus of 30 per cent. on the base pay of the worker, payable weekly, with no obligations attached.

A further boost to production has been given by a form of instruction to less experienced workers. Seven such workers are placed under the supervision of a "gang boss" who is experienced and knows the work thoroughly, and by thus splitting up the force in these departments into "gangs," every man has the benefit of direction and consultation with skilled men.

There has been a slight reduction rather than an increase in the working force during the eight months that the production has gone up 100 per cent. Weekly working hours have been cut from 52½ to 47½ hours.

The Employees' Representative Committee has been a potent instrument in driving discontent from the factory. Formed experimentally in October, 1918, its work was so effective that in May, 1919, the committee became a permanent Plumb institution.

It is composed of twelve representatives of the employees (elected by secret ballot semi-annually), and four representatives of the company, appointed by the president with a power of three votes each. Each member of this committee is charged with constant and careful observation of the department in which he works, with the view of making recommendations to the general committee, which meets bi-monthly.

Complaints by workmen are submitted first directly to the foreman or superintendent, and, failing settlement satisfactory to the worker, they are carried to the works manager. Appeal may be taken from his decision, in writing, to the Employees' Representative Committee, where action by a majority vote is final. Should the committee be unable to agree on a majority vote, the complaint is taken before four members which the Representative Committee picks from its number, sitting in conference with the president, secretary, works manager and comptroller of the company. A majority vote is final in this Committee of Final Adjustment.

No individual complaints have yet been made which have not been settled satisfactorily before reaching the Representative Committee, and at no time has the Representative Committee failed to reach an agreement.

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Transformer and Fuel Oil Stored in Concrete Tanks

DURING NEARLY TWO YEARS' test, three concrete tanks, at the Trafford City Foundry of the Westinghouse Electric and Manufacturing Company, built in the summer of 1918 have proved satisfactory as fuel oil containers. Recently, one of the tanks was used to store transformer oil, and held the light-flash oil as easily as the heavy fuel oil.

Each of the tanks has a diameter of 37 feet with a capacity of 125,000 gal. Built of reinforced concrete the tanks have successfully resisted the weather and the little seepage that occurred was easily stopped. Recently the tanks were inspected by a representative of the United States Bureau of Standards, who is making a study of the use of concrete tank for storing oil.

The tanks have been used to store oil for use in both the foundry and the works at East Pittsburgh, Pa., a small pumping station being used to drain oil into cars for shipping. It is thought that as the first tanks have proved so successful other concrete containers will be installed as needed.

Thus concrete displaces steel in another field hitherto unapproachable.

Editorial Comments on the Issues of the Day

The hearing granted the users of open-top cars by the Interstate Commerce Commission, July 8, 9 and 10, has not altogether ceased to be a live issue because many rock products operators believe that so little impression was made by their pleas that the order restricting the use of open-top cars to coal-carrying service is likely to be extended for another 30 or 60 days.

Car Hearing In Retrospect

Daniel Willard, president of the Association of Railway Executives, practically admitted that the situation was desperate and that the railway executives themselves had asked the commission to issue the order because the railways had neither the legal right or the inclination to discriminate between shippers. Moreover, he said the order was relieving the situation, asked for its continuance and stated that under its provisions the railways had ample authority to take care of all the other traffic besides coal, that it was possible for them to do.

The other witnesses, who bore out Mr. Willard's testimony, were representatives of public utility corporations from the big cities, who testified of the straits these utilities were in for coal, and the vice-president of the National Coal Association, who with the help of an expert lawyer, cleverly unloaded the charges of profiteering upon coal brokers and dealers; and painted a sorry picture of the miners' ruin for want of an adequate supply of cars.

Instead of being able to support their case with a sad picture of the public suffering from cold, hunger and death, the building material producers could only point to their own business ruin. In other words, the railways and the coal men appeared in the light of big-hearted brothers of the poor public, while the building material men were placed in the light of selfish, self-centered business men.

How untrue that picture is to life every reader of this knows; but the general public does not know. Only one witness for the building industry—V. O. Johnston, president of the National Association of Sand and Gravel Producers—held steadfastly to the seemingly obvious fact that a roof over our heads may be just as important to life and health as coal in the coal bin.

However, there was very little constructive in the testimony of the building supply interests to offset the testimony of Daniel Willard. John Rice, president of the National Crushed Stone Association, offered one of the few constructive suggestions made, when he stated:

> I recognize your difficulty in handling that situation, but speaking for myself and for a great many others in our industry, if it could be arranged that the railroads were allowed more latitude, or more discriminatory powers for the handling of this proposition, I believe we would be very materially helped, and without as great disadvantage as is thought, because the movement is so largely local, the condition is so largely local, that the railroads are really in very close touch and understand whether or not it is necessary for us to do a certain thing, and how much the furnishing of the cars for that purpose would interfere with the coal movement. I know some of the railroads have stated that they could handle our whole business without disadvantage to themselves or the public or to the coal movement.

Many of the witnesses for the construction industry undoubtedly hurt the cause far more than they helped it. For instance when a representative of the Massachusetts State Highway Commission testified that they must have material to repair a road which was being ruined by a great woolen manufacturer who shipped his entire output from the interior to the port of Boston by motor truck, and thence to New York in his own boats it was certainly a piece of testimony well calculated to arouse sympathy and help from the representatives of the railways which were being deprived of this business, and are facing big deficits which the Interstate Commerce Commission is pledged to make good for the loss of just such business. Likewise when a representative of the American Automobile Association attempts to overcome the testimony of public utility experts, starving for coal, with the statement that he represents 250,000 joy riders who would like to see every road a boulevard, he makes a fine showing.

Indeed the situation is most unfortunate, but if out of it comes the decision of the Interstate Commerce Commission to let local railway officials use some discretion in dealing with the problem, at least some progress is made. Broad drastic orders fail to take into account that although the coal shortage problem is a huge problem, that it is spread out over 3,000,000 square miles of territory, more or less, and that an efficient solution of it can be reached only by the independent judgment, common sense, experience and initiative of some individual for at least every 10,000 square miles of that territory.

Evidence begins to pile up that there is no real shortage of coal. For example, no less an authority than Charles B. Ames, assistant attorney general of the United States, after some weeks' investigation of the situation, is quoted in the Chicago "Tribune" of July 30 as stating: "There is no actual coal shortage. The situation is like a bank which has money enough to pay all its depositors, but is not able to withstand a run on the bank. The consumers are fearful of a shortage of coal and are bidding against each other in order to get a supply."

Shortage of Coal?

If he is correctly quoted the sand and gravel men are certainly justified in taking their case to the highest court in the land—and Mr. Attorney General had better turn his attention to the Interstate Commerce Commission for malfeasance of office in acting without sufficient knowledge or comprehension of the situation.

Accident Records — How to Compile Them and How to Use Them

(Prepared by the Engineering Department of the National Safety Council)

THIS IS THE CONCLUDING article of a series on the keeping of accident records. Starting with the next issue will be a series on conveyor hazards and how to avoid them. This series will be interesting and important to every producer in the rock products industries.

Record of Employment

It is to be assumed that the employment department has a permanent record of each employee, showing employee's sex, age, race or nativity, whether married or single, number of children and other dependents, the date employed, whether at the time of employment he had any physical defect or deformity, such as defective sight or hearing, and possibly other information. It is advisable that the information given by employee at time of accident be checked with his employment record card.

Return to Work Notice

When an injured workman has recovered sufficiently to return to work, the medical department should notify the safety department, with copies to the foreman and the employment department if desired. Form 4 is well adapted for such notification. If a practicing physician attends the injured person, or if the plant does not have a dispensary or hospital, it may be more satisfactory for the doctor to notify the safety department (preferably in writing) when injured men are able to resume work, after which the safety department will issue Form 4 to the departments concerned.

Tabulation of Accident Data

With a satisfactory system for recording the facts in connection with each accident, the next step is to compile the data so as to be useful. A uniform method of tabulation should be followed so that one plant may be compared with another and one industry with another. The National Safety Council's Committee on Uniform Industrial Accident Statistics recommends the use of the standard method approved by the International Association of Industrial Accident Boards and Commissions, the essentials of which are stated below.

Tabulatable Accidents, Diseases and Injuries

All accidents, diseases and injuries arising out of the employment and resulting in death, permanent disability, or in the loss of time other than the remainder of the day, shift, or turn on which the injury on which the injury incurred should be classified as tabulatable accidents, diseases and injuries."

Compensable Accidents, Diseases and Injuries

These, as used in any report in accordance with the practice in any particular state, should be shown separately and clearly defined.

Permanent Total Disability

To this group should be assigned every accident, disease, or injury which is designated by statute as permanent disability, or which permanently incapacitates the workman from performing any work continuously in any painful occupation.

Permanent Partial Disability

To this group should be assigned every accident, disease or injury (less than permanent total disability) which results in the loss of any member of the body or part thereof, or in the permanent impairment of any function of the body.

Accident Frequency Rates

The practical value of accident statistics is greatly increased by the use of frequency rates. The basis of all rates is necessarily the number of men exposed to the risk of accident. Since the working time varies, it is necessary to reduce the time factor to a standard basis. The Association of Accident Boards recommends that accident frequency rates be expressed in terms of the number of lost time accidents per 1,000,000 hours actually worked by the employees.

Quarry Blasting Accident Kills Six Men

THE ACCIDENTAL EXPLOSION of about 500 lbs. of dynamite at the quarry of the Katterjohn Construction Co., Cedar Bluff, near Princeton, Ky., on July 13, caused the deaths of six men and serious injuries to several others. The accident occurred during the noon hour when the blasting crew was loading holes preparatory to the regular noon day blasting.

Accounts received do not give the cause of the accident, and of course it may never be known, but it appears that the dynamite was in boxes piled near where the crew was working. Possibly it was exposed to the sun on a hot summer day, which, it is well known, will cause the nitroglycerine to exude on the surface of the cartridges and render them extremely sensitive.

At this place it is well to remind all quarry operators of four simple, fundamental rules, which possibly would have avoided the serious consequences of this accident and many similar ones that are all marked up against the score of the quarry industry and have a direct effect on employers' liability insurance rates, to say nothing of the humane side of the question. The four rules are:

"(1) Carry detonators and electric detonators, separated from explosives.

"(2) Make up primers at or near working place.

"(3) Keep electric detonators away from batteries, blasting machines and other sources of electric current until immediately before blasting.

"(4) Carry and store explosives at such times and such places so that should premature explosion occur, it will injure the least number of persons."

Ninth
Annual Safety Congress
"BACK TO MILWAUKEE"
Sept. 27 to Oct. 2, 1920

"The Annual Safety Show"—covering 46,000 sq. ft. of floor space—will present under one roof a thoroughly comprehensive display of up-to-date appliances and equipment for safeguarding the health and lives of workers.

For detailed information write
W. H. Frater, Business Manager
National Safety Council
Co-operative—Non-Commercial
168 North Michigan Avenue
Chicago, Illinois

Interurban Electric Railway Supplies Louisville With Cement

Railways' Failure to Take Care of Building Industry Costs Them Permanent Loss of Business

LOUISVILLE IS PROBABLY THE ONLY CITY of any size in the United States which today is receiving an adequate supply of cement. The Louisville Cement Co., whose mill is located at Speeds, Ind., twelve miles from Louisville, is bringing in an average of 1,000 to 1,200 barrels of cement daily on the lines of the Louisville and Southern Indiana Traction Co. Half this amount was a good day's work when the company depended on steam lines for transportation of its product. The entire cost in the two methods of transportation is practically the same.

When the railroad car shortage first began to make itself felt in the local field, when cars could only be had by begging the steam roads for them and then getting about 30 per cent of what was ordered, the Louisville Cement Co. began to scout around. The only solution which presented itself was truck transportation. Until a year ago this method was employed. The roads between Speeds and Louisville, none too good in the first place, and under the steady grind of heavily laden trucks becoming worse, were a tough and expensive proposition. With the completion of the traction company's lines and the acquirement of equipment, the truck method was dropped.

The traction company furnishes the cars. At present flat cars are being used, tarpaulins preventing any loss by rain. Box cars which will be used exclusively in this work are now being built by the traction company and will be put into operation shortly. The cars are shunted into the mill at Speeds, though lack of facilities now necessitates hauling the cement some distance from the mill to the siding. This haul will be eliminated by the construction of a packing room with a capacity of 2,000 barrels on the interurban line. When it is completed the cement may be loaded directly on the cars by means of hand trucks. Within an hour after loading at Speeds, the car is on the siding in Louisville being unloaded into the cement company's trucks, which haul it to warehouses or to jobs.

The construction of a warehouse is under way in the traction company's yards at the present time. When it is ready for use the cement may be taken directly from the car into the warehouse by hand trucks. The new warehouse will have a capacity of about 1,500 barrels, which is ample to take care of the company's needs. This warehouse will make nearby towns in Kentucky easy of access with a minimum of handling. The switch upon which the warehouse is built is the property of the Interurban company, but has been rented for a long period at reasonable rates.

A small per cent of the mills' production is sent to other Indiana towns, including Indianapolis, by way of traction lines. This is done, however, only after the Louisville market has been fully supplied.

Practically no cement has been shipped from Speeds to Louisville by way of steam roads since the Interurban has been in position to do hauling. Transportation by electric railway avoids many troubles, among other things, shortage of railway cars, delay in getting a sufficient number of cars, delay in having cars pulled from the siding at Speeds, delay in Louisville railroad yards, loss through inability of the steam road to place cars promptly. The saving in time alone would justify almost any reasonable freight rate.

The cost of interurban hauling is no more than that by steam road. At the present time it does cost a little more, on account of the extra handling it incurs, but when facilities at Speeds and in Louisville are completed, the costs will be practically the same. The cost of handling similar amounts of cement from Speeds to Louisville by truck was about three times as much as it is by the Interurban, and the electric railway service is just as good and faster.

It was not an unusual thing when the steam roads were doing the hauling for a car of cement to remain in Louisville as long as a week without being placed on a team track or warehouse siding. Frequently a car would be lost in Louisville yards and then turn up after the pressing need for it had passed. Shipments which the company was especially desirous to rush to Louisville were often held up for days at a time for lack of cars. In the summer, closed cars were sent west to be used in shipping the wheat crop. Now, in Louisville, the traction company is building, at its own expense, box cars which will be used for no other purpose than to haul cement from Speeds direct to the cement company's warehouse.

All that the present method of handling lacks of being ideal is the fact that the Interurban has no sidings in different parts of the city, which would eliminate long truck hauls and second handling when loading at the warehouse.

With 5,000 barrels of cement in stock, and from eight to ten car loads coming in every day, the Louisville Cement Co. is in position to take care of all demands made upon it.

Fertilizer Manufacturers Seek Government Aid for Cars

STRONG REPRESENTATIONS have been made to the Interstate Commerce Commission and to the committee on car service of the American Railway Association in an effort to secure more cars for the fertilizer industry. Between now and the middle of September 40,000 carloads of mixed fertilizer should be distributed, it was claimed. In addition 25,000 carloads of fertilizer raw materials must be moved in the near future. It was pointed out that fertilizers were given the benefit of priorities during the war, and that the need for their use is greater now than then.

As a result of persistent efforts farmers have been induced to place their fertilizer orders early this year. This was done with the idea of lowering the peaks in the distribution of fertilizer. The plan worked out more successfully than had been anticipated, but the distribution cannot be carried on in the required volume, as cars cannot be obtained in sufficient numbers to take care of the transportation.

Due to inability to secure phosphate rock many acid plants have been forced to close, the committee on car service was told. Practically every plant in the country is receiving its supplies in a hand to mouth manner. Not less than 250 cars daily are required to handle the necessary phosphate rock from Florida. About 50 per cent of the cars needed are being furnished.

The committee which came to Washington to take up the matter of car supply was composed of Spencer L. Carter, Virginia-Carolina Chemical Co.; DeWitt Brown, Armour Fertilizer Works; Robert B. Allen, Smith Agricultural Chemical Co.; T. A. Bosley, Virginia-Carolina Chemical Co.; A. S. Key, Federal Chemical Co.; H. Braunlich, American Agricultural Chemical Co.; J. W. Hoyt, International Agricultural Corp.; D. A. Dashiell, F. S. Royster Guano Co.; Douglass Ober, G. Ober & Sons; A. D. Whitamore, American Cyanamid Co.; Frank G. Moore, Davison Chemical Co.; J. W. White, International Agricultural Corp.

Subsequently the commission ordered the railways to furnish the fertilizer men with 75 per cent of their car requirements.

Construction Industries Mark Time While Coal Moves

Conditions Generally Appear to Be No Worse Than a Month Ago, and in Some Sections Better

WEST OF THE MISSISSIPPI RIVER conditions seem to have improved somewhat since the issue of the order directing the Western lines to send all their open-top cars East to relieve the coal situation. Plants in Iowa, Minnesota, Kansas, Oklahoma and Texas are said to be getting about one-quarter to one-half of their quota of cars.

East of the Mississippi River the situation continues to be pretty bad and many plants have closed temporarily, although others continue to get out some material. The Interstate Commerce Commission, pursuant to Mr. Willard's implied request, has given the railways some leeway in the interpretation of the order, so that many of them have found it possible to take care of some of their mineral aggregate business through use of cars moving in the direction of the mines.

In the East, in New England, old flat cars with temporary sides, unfit for coal loading, are being used to move sand, gravel and stone quite extensively, and the New York, New Haven and Hartford Railroad has had to request the Interstate Commerce Commission to modify its minimum car loading for these commodities as it is physically impossible to attain it with this kind of equipment.

The coal situation, the alleged cause of all this stagnation in the building industry, does not improve so fast as was to be hoped. Prices continue at a high level and up to this writing the Interstate Commerce Commission had done nothing to curtail the reconsignment privilege, which many business men believe is the key to the whole problem. A vast army of brokers and business leeches depend upon this for a living and their influence at Washington is enormous.

Many well-posted men hold that there are cars enough for the country's business if they were expeditiously handled. Railway men have recommended curtailment of the reconsignment privilege many times, but the Interstate Commerce Commission has always turned them down. Railway men are also recommending increased demurrage rates, but this of course is meeting with the opposition of all shippers and consignees alike.

The Silver Lining

No cloud is so black but has a silver lining. In the present car situation some rock products operators are so gloomy as to see no relief for several years to come. Mr. Willard, president of the Association of Railway Executives, has expressed the belief that by another spring the railways could adequately handle the business expected of them.

The increases of pay granted railway workers in all lines ought to make railway work attractive to intelligent workmen, and probably will soon give the railways an opportunity to weed out many of the inefficient ones. Indeed the Pennsylvania Railroad has already started the ball rolling by laying off 10,000 employees.

The present car shortage is leading many of the big users of equipment to own their cars. The railways are said to be urging the big steel companies to build their own open-top cars, since they have plenty of money and credit, both of which the railways are lacking. The railway executives have already met and agreed to work for a very high (30 miles) average daily car mileage.

If all these things are done, and the Government does not interfere too much there is good reason to believe that another spring *will* see conditions much changed for the better. Evidently that is the general belief for there is no let-up in new incorporations in the rock product industries and improvements and enlargements of existing plants go on without interruption other than delay in receipt of the necessary machinery and equipment.

How long operators can keep going this year at one-quarter or less of their normal production is problematical. Unless they are in a position to greatly increase prices it is difficult to see how they can make both ends meet. As this issue of ROCK PRODUCTS goes to press a canvass of our entire list of plants reporting prices is being made and it is hoped in the next issue to make an analysis of price tendencies.

Interstate Commerce Commission Succumbs to Pressure of Steel Industry

ON JULY 29, the Interstate Commission modified its Service Order No. 9 to allow the steel industry the use of 15,000 "coal cars" for transporting steel products. Is this another example of special privilege, against which every true-hearted American fights to the last ditch? Or is it a public acknowledgment that the seriousness of the coal-shortage problem was overestimated. It must certainly be one or the other.

Cleveland Building Operations

Privately Owned Box Cars and Chartered Lake Vessels Keep Some Building Materials Moving

THE BUILDING INDUSTRY in Cleveland is marking time until conditions improve in the matter of transportation for materials. Coupled with this drawback is also a well-established feeling that labor costs and conditions will be more favorable if those contemplating building operations postpone their undertakings. The record of permits show a very low ebb for mid-summer, when as a general thing the peak of operations is reached.

There has been some improvement in the securing of materials, especially cement and plaster, on account of the use of lake vessels for transportation. The Cleveland Builders' Supply and Brick Co. has purchased 60 freight cars, in order to help meet the situation. These cars are to be used only for transporting lime, plaster, and other essential building materials, and not be diverted for other uses.

The American Gypsum Co., Port Clinton, Ohio, is relieving the situation somewhat by shipping on lake vessels. The company has chartered two vessels and is thus able to keep its mills busy.

The outlook for fall operations at this time is very uncertain, and depends largely upon what progress is made in removing the priority order for coal.—C. A. B., Cleveland, July 27.

Sutton's Recommendations for Getting Car Service

Business Manager of the National Association of Sand and Gravel Producers Says "Co-operate With Your Local Railway Officers"

THE COMMISSION ON CAR SERVICE of the American Railway Association is now passing through another period of re-organization. It will now operate under the direction of an Executive Manager, to be appointed by the Advisory Committee of the Association of Railway Executives, of which Daniel Willard is chairman. In addition to supervising the work of the Commission on Car Service, the Executive Manager, yet to be selected, will "deal with questions arising between the carriers and the Interstate Commerce Commission."

D. E. Spangler, formerly General Superintendent of Transportation, Norfolk & Western Railway, and recently appointed to Commission on Car Service, now has charge of the distribution of open-top cars. Following you will find copy of letter received from Mr. Spangler, following a series of conferences which I had with him subsequent to the hearing before the Interstate Commerce Commission on July 8-10.

In view of the suggestions and recommendations contained in Mr. Spangler's letter, it seems appropriate to repeat in substance the plan of procedure outlined in my Circular No. 2-1920.

1. Endeavor to secure cars in the normal way through the local, division and general officials of the railroads serving your plant. (Application to the Terminal Committees of the Commission on Car Service may prove helpful in some instances.)

2. In the event cars are not furnished after exhausting every ordinary means, then submit report, using the enclosed blank, to the National Association, and your case will be taken up promptly with the Commission on Car Service for attention.

In addition to the information requested on the "Car Shortage Report" blank, it will be of great assistance in investigating each situation if a railroad map or a rough sketch is submitted showing the location of your plant and the points to which you desire to make shipments, stating also whether the movement is in the direction of or away from the coal mines. It is especially desirable to have full data, not only to hasten the handling of the complaint, but for use in the event it is necessary to ask the Interstate Commerce Commission for authority to deviate from strict compliance with the various Service Orders, as will be done in specific cases.

It is urged again that you try your best to get satisfactory service from the railroads before asking for help, but do not hesitate to send in a report if cars are not furnished, being sure to give clear, accurate data. Mr. Spangler has opened the way for co-operating; it is your privilege to take advantage of the offer.

E. GUY SUTTON,
Business Manager, National Association of Sand and Gravel Producers.

July 23, 1920.

AMERICAN RAILROAD ASSOCIATION COMMISSION ON CAR SERVICE
718 Eighteenth St., N. W.
WASHINGTON, D. C.

July 19, 1920.

Mr. E. Guy Sutton, Business Manager,
National Association Sand and Gravel Producers,
c/o Washington Hotel,
Washington, D. C.

Dear Sir:

To establish co-operation between the gravel and sand shippers and the serving railroads, the first essential, it would seem, is a full understanding of each other's situation and needs, and the character of service to be performed in each instance. To this end the shipper should deal directly with the local railroad management before coming to any authority at Washington—the advisability and necessity for this are obvious.

In handling these matters with the initial railroad, we regard it important for the shipper, in placing requisitions for cars, to transmit all essential informative facts with respect to the variable type of equipment that can be used, destination and full route of shipments, actual daily loading ability and the uses to which the production is to be devoted. Full information in every respect will be suggestive of the greatest permissible service that can be attained from car movement in harmony with the general regulations in respect to car handling that may be necessary for the Interstate Commerce Commission or the American Railroad Association, through its Commission on Car Service, to institute from time to time.

Also the Commission on Car Service has committees at a number of strategical interchange and terminal points, through whom applicants can work when local roads are unable, from their own resources, to meet a situation. You probably have a list of these committees; if not, we shall gladly furnish you one.

When local railroads are unable to meet a situation they naturally will inform the applicant of the reason, whereupon the shipper is likely to seek assistance from authority of more extended jurisdiction than that of the individual local road; if a shipper considers it desirable or necessary to go farther than the local road with the intention of ultimately applying to some Washington authority, it seems to me it would avail most to conduct such negotiations through his Washington representative, if he has one, or through his Trade Association representative where such relation is established; in all instances full information as indicated above should be supplied, together with correct advice of prevailing car distribution, so that when the application reaches a Washington authority, comprehensive action can be taken.

Am returning the proposed form of report which you intended to transmit to this Commission to cover cases of inability to procure cars. This will, we believe, provide the necessary information to aid us in intelligently developing a situation for such relief as may be practicable to extend. It is our desire to co-operate with you as representative of sand and gravel operators in every particular that will be of mutual benefit to the shippers and the railroads.

COMMISSION ON CAR SERVICE.
D. E. Spangler.

Gravel Men May Sue

A MEETING of the Executive Committee of the National Association of Sand and Gravel Producers was held in Chicago, July 29, to decide what further measures would be taken to obtain justice for the industry in the matter of transportation. It is likely that the advice of the foremost legal talent of the country will be sought.

A resolution was passed outlining the policy of the association as against the granting of special privilege to any industry or class at the expense of other industries, or the public, except in instances of actual dire public distress.

The sand and gravel industry throughout the country is facing bankruptcy because of a discrimination between users of the transportation service, which is based more on dire predictions of what might happen rather than on any evidence of real public distress.

Well informed business men doubt the legality of an act which practically confiscates the property of a great industry without due process of the law. If it should prove that no real coal famine exists and that the commission was unduly influenced by the coal men, and that the result of the commission's act was an effectual assistance to coal profiteering, the Interstate Commerce Commission, it is believed, may have committed an illegal act. And such a thing is not beyond the range of possibilities.

A resolution was also passed endorsing the work of Senator Calder's committee, which is investigating the causes of the present stagnation of the building industry. It was voted to have the business manager, E. Guy Sutton, co-operate with the committee to the greatest extent his time will permit. Thus far Senator Calder's committee has sat in New York only, but will soon have hearings in Chicago and other cities.

General News from Rock Products Markets

Bestwall Consolidates With Beaver Board

THE BESTWALL MANUFACTURING CO., manufacturers of "Bestwall" wall board, with plants located at Akron, N. Y., and Grand Rapids, Mich., have consolidated with The Beaver Board Companies, of Buffalo, N. Y., and the American Cement Plaster Co., of Chicago, Ill., and Lawrence, Kan.

The new amalgamation places the extensive gypsum mines of the American Cement Plaster Co., with estimated deposits of between twenty-five and thirty million tons, at the disposal of the Bestwall plants, and thus insures them an unlimited supply of raw material.

The association with Beaver Board not only gives the Bestwall Company the assurance of an unlimited supply of fiber liner, but also gives them the advantage of the extensive resources of the Beaver Board Companies and enables them to carry out immediate plans for expansion. Manufacturing facilities are already being rapidly increased and by January 1 the Bestwall plants will have a much larger production and a considerably wider distribution.

At the present the Bestwall mills are far behind orders, and the first effort will be to speed up production in every way possible. No change is contemplated in the management of the company and the Bestwall offices will continue to serve the trade as in the past.

To Collect Data on Tonnage of Road-Building Materials

CLOSE CO-OPERATION among the railroads, the U. S. Bureau of Public Roads and state highway officials is planned in order to prepare systematically for the transportation of road-building materials.

At present there are no figures available which indicate on a national basis the tonnage of road materials which are transported by rail. Figures will be gathered to show the number of cars which are required for this service; the numbers which are used for each class of material; the numbers used at each of the important loading points; and the various other facts which may be necessary to point out in detail the transportation requirements of the nation's road-building program.

One of the lessons of the present transportation difficulty, according to Thomas H. MacDonald, chief of the Bureau of Public Roads, is that it is not sufficient to leave to the individual contractors the matter of arranging their own transport. The Bureau expects to be helpful in that connection in the future.

Public Education A Field for National Associations

ONE OF OUR GRAND ECONOMIC ERRORS consists in practically ignoring the policies of governmental bodies until these policies have resulted in ills that could easily have been foreseen by professional and business men. Then we try to excuse the effects of our own negligence by damning the Government officials whom we should have tried to guide. We know that such officials are rarely as well informed as we are respecting our business, yet we allow them to develop policies that will affect our business, and we remain inattentive to their theories at the very time we should be "all eyes and ears." Only after we are hurt do we ordinarily arouse ourselves, and even then our activity is apt to be confined to protests rather than to constructive programs.—From "Engineering and Contracting."

Agricultural Limestone Producer Meets Car Shortage

A PROMINENT SOUTHERN agricultural limestone producer is meeting the car-shortage problem by refusing orders for less than a minimum car load of 33 tons. This practice helps take care of the problem of orders in excess of the plant's ability to ship with present transportation restrictions, and also helps make the producer popular with the railway—which helps in getting cars.

As They Do It in Washington

SOUTH BEND, Wash.—It is understood that the state, at the instance of the county commissioners, may sue to condemn the gravel deposit on Long Island in Willapa Bay, now owned and worked by the Long Island Sand & Gravel Co. A larger supply of hard gravel is needed and little gravel is found in the county which has the wearing qualities of the Long Island gravel. In this connection it might be said that the commissioners inspected a gravel ledge near the fort at North Cove and found what appears to be a fine deposit there, but it would have to be tested out. The ordinary gravel in this county looks hard enough, but it slacks on exposure or is easily ground to a powder under heavy traffic such as the main highways must now stand.—"South Bend Journal."

Cement Up 30 Cents a Barrel in New York

RAILROAD CAR RESTRICTION orders circumscribing limestone as well as coal deliveries at cement manufacturing plants added another 30 cents a barrel to construction costs last week, says the Dow Service Building Reports.

Plants in the Lehigh and Hudson cement manufacturing districts are closing down because they can get neither limestone nor coal and yet the current stock on hand is 25 per cent less than that of a year ago with demand probably eight times what it was then. Production in Zones 1 and 2 supplying this market is 35 per cent greater than at this time last year with shipments to New York and New England at least 75 per cent greater than at this time last year so far as the first six months of this year are concerned. Shipments into New York and New England for the first 15 days of July were 25 per cent greater than they were last July despite the car shortage, which gives a fair idea of the part that the motor truck has been playing.

The demand for cement even at the advancing prices has been so insistent that with the non-delivery of coal under contract price that the cost of the coal consumed, at the premium prices manufacturers now have to pay for fuel for the manufacture of a single barrel of cement is more than the cost of a whole barrel of cement, burned, packed and delivered, only a little more than a year ago. Cement in stock in all the manufacturing plants in the country today is 25 per cent below the total quantity available for sale at this time last year.

There is still great difficulty in getting lime in sufficient quantities to meet the market's needs, but outside of this instance, there are unmistakable signs that an improvement in the building material supply situation may be conservatively looked for from now on.

Limestone Warehouse Idea Spreading Rapidly

THE COUNTY FARM BUREAUS of Ohio, Indiana and Missouri are particularly active in promoting farmer cooperatives which build and operate central storage plants for agricultural limestone. This is the one factor in agricultural lime and limestone promotion necessary to assure the wonderful future in store for these commodities.

Illinois has been the leader in the cooperative warehouse idea, which seems to be have been enthusiastically received in bordering states. The National Agricultural Limestone Association has been particularly active in promoting the plan.

NEW MACHINERY AND EQUIPMENT

Raymond Mill Improvement That Gives Big Increase in Capacity

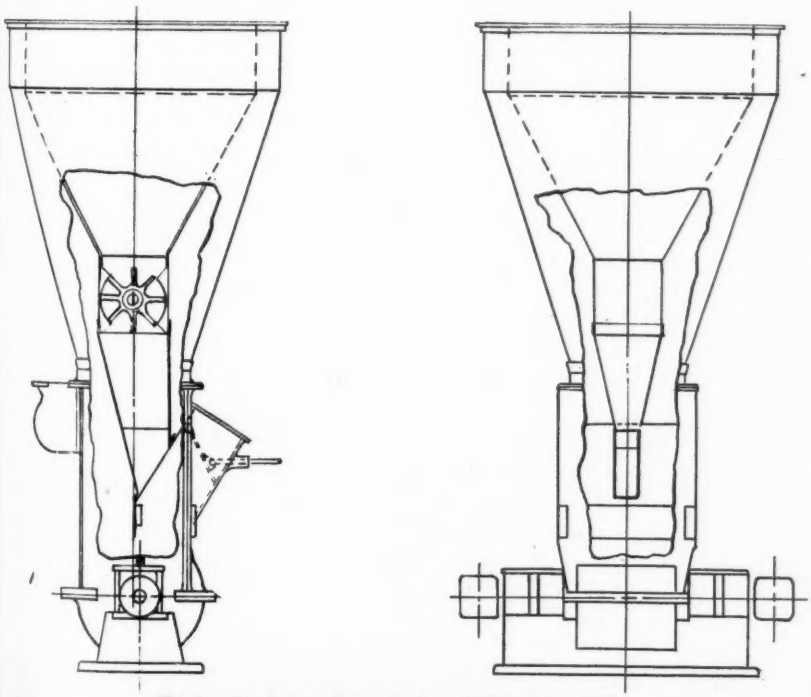
A SIMPLE CHANGE in the construction of the Raymond mill has been devised, which in one installation that has already been made more than doubled the output of hydrated lime.

With the Raymond mill as now constructed the rejections in the inner cone were dropped back into the beater chamber, where the upper current of air seems to have kept a considerable amount of the material in suspension, and prevented a free flow of the material to the grinders.

By a simple device easily added to any Raymond mill of this type, the rejections of the inner cone are chuted to the return-air inlet and the current deflected downward so as to insure the material being promptly put through the grinding ring.

A patent for this device has already been applied for by the Raymond Bros. Impact Pulverizer Co., Chicago, Ill., who will guarantee it to increase the capacity of their mills 50 per cent.

A full and complete discussion of the principles of the Raymond mill and of air separation was published in ROCK PRODUCTS of April 10, 1920, pages 34 to 37.



Device for increasing capacity of Raymond mills

Operating Data on Large Electric Shovels at Queenstown Development

By L. C. M'LURE

Industrial Department, Westinghouse Electric & Manufacturing Co.

RECORDS MADE IN EXCAVATING the Queenstown-Chippewa power canal by the Hydro-Electric Power Commission of Canada have fully shown the value of large electric shovels. Over 20,000 cu. yd. of earth and rock are removed daily in digging this canal, the major portion of this being accomplished by means of three 8 cu. yd. electric shovels. Not only have the volume records indicated the success of these shovels—which, by the way, are the largest in the world—but the operating economies have also proved conclusively the value of this equipment.

The operating economies were found by making a thorough test on shovel No. 1. This Bucyrus shovel is of 300-ton weight, has a 90-ft. boom, uses either 5, 6 or 8 cu. yd. buckets and works on a 40 to 50-second cycle. There are four Westinghouse 440-volt, 3-phase, 25-cycle motors in this shovel used as follows: Two 250 hp. for hoist, one 150 hp. for thrust and one 150 hp. for swing. The controllers are of the master-switch, magnetic type and the whole operating is handled by two men. This shovel was working 90 ft. below the surface and loading material on cars approximately 70 ft. above their own base.

Tests were made with a graphic wattmeter connected in the 4,000-volt circuit near the shovel. A high-speed clock in the meter allowed the chart paper to pass the pen at the rate of about 5.5 in. per minute. A check was made against the chart by noting the starting time of each operation during the entire test. The test covered a period of seven days, work being done only during the daytime for the first five and both day and night for the last two. The results of the test are summarized below:

	Total yardage	K.W.H.	K.W.H. per yard
Whole test	24,406.5	20,436	0.826
Day work only	15,380.0	12,216	.794
Day and night	9,326.5	8,220	.882

From the accompanying table it is seen that the kilowatt hour for each cubic yard dug and lifted 70 ft. and loaded into a car was approximately 0.8.

An interesting feature of the operation of these shovels is the fact that regenerative braking is utilized whenever possible. In this particular instance it is used when the bucket is lowered the 70 ft. after it has been raised that distance in order to load the cars. This is accomplished as follows: When the operator is ready for the bucket to come down, the motors are connected to the power supply and the bucket falls with the motors running at slightly above synchronous speed. When such a condition is reached, the motors operate as induction generators. Although as can be seen from the curve, some energy is generated and pumped back into the line, this item is not the main feature of this operation. This method of lowering saves mechanical wear and tear as the brakes are required only for stopping and holding the bucket, requiring less repair work and making the whole equipment more reliable.—From "Engineering-Contracting."

One of the largest quarries in Michigan is now experimenting with a 300-ton electric shovel, and if the experiment proves successful will make a complete installation of this type.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			1.40 per net ton, all sizes			
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Coldwater, N. Y.	1.80	1.80	1.80	1.65	1.65	2.00@2.25§
Grove, Md.	1.45	2.50	2.40	2.00	1.60	1.45
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00‖
Utica, N. Y.	1.00		All other sizes 1.50			
Vernoy, N. J.	2.00	2.25	2.00	1.80	1.60	.....
CENTRAL						
Alden, Ia.	.80	1.50	1.50	1.45	.....	.....
Alton, Ill.	2.00	1.75	1.75	1.75	1.75	.....
Bettendorf, Ia.			1.75 per cu. yd., all sizes			
Chicago, Ill.	1.48	1.80	1.60	1.48	1.48	1.48
Cincinnati, Ohio	.....	2.00	2.00	2.00	.....	.....
Cleveland, Ohio	.....	2.40	2.20	2.20	.....	.....
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*	.....	.....
Dundas, Ont.	.75	1.50	1.50	1.50	1.25	1.20
Eden and Knowles, Wis.	1.20	1.20	1.20	1.20	1.20	.....
Elmhurst, Ill.	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Ft. Wayne, Ind.	1.60	1.90	1.90	1.80	1.60	1.60
Greencastle, Ind.	1.25	1.25	1.10	1.10	1.10	1.10
Hull, Canada	2.50	2.30	2.50	2.10	2.00	1.75
Illinois, Southern	2.00	1.50	1.50	1.50	1.50	.....
Kokomo, Ind.	1.15	1.25	1.25	1.20	1.10	1.10
Lannon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.40	1.40	1.40	1.40	1.40	1.40
Linwood, Ia.	1.00	.....	1.45	1.25	1.25	.....
Mansfield, Ohio	1.70	2.20	2.00	1.90	1.70	1.70
Mayville, Wis.	1.00	.....	1.20@1.25	1.20@1.25	1.20	1.10
Montrose, Ia.	1.25	1.75	1.75	1.65@1.75	1.65@1.75	.....
Oshkosh, Wis.			1.40 per ton, all sizes			
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.50	1.25
Silica, Ohio	1.00	1.50	1.30	1.20	1.00	1.00
St. Louis, Mo.	.60	1.60	.....	.....	.....	.....
Toledo, Ohio, f. o. b. cars	1.60	2.10	1.90	1.80	1.60	1.60
Toronto, Canada	1.55	2.25	2.25	2.25	2.05	2.00
Winnipeg, f.o.b. cars	2.90*	.....	3.25*	2.90*	.....	.....
SOUTHERN:			These prices include 90c freight			
Brooksville, Fla.	1.50	.....	.....	3.00	.....	.....
Cartersville, Ga.	.....	2.75	.....	2.75	2.75	2.50
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	1.75
El Paso, Tex.	1.00	1.00	1.00	1.00	.....	.....
Fort Springs, W. Va.	1.30	1.50	1.85	1.75	1.60	1.50
Garnett, Okla.	.65	.....	1.65	1.65	1.50	.....
Mascot, Tenn.	.....	1.50	2.00	.....	1.50@2.00	.....
New Braunfels, Tex.	.60	1.75	1.75	1.50	1.50	1.50
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	1.90	1.90
Blue Springs and Wymore, Neb.	.20	1.85	1.85	1.75@1.80	1.65@1.70	1.60
Kansas City, Mo.	**.60**	**2.00**	.....	.....	.....	.....
Mankato, Minn.	.....	.....	.....	1.75	1.50	.....
Terminous, Calif.	.....	1.00	.....	.....	.90	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.80	1.75	1.65	1.45	1.25	.....
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Bound Brook, N. J.	2.10	2.30	2.00	1.80	1.60	.....
Dresser Jct., Wis.	.75	2.45	2.45	2.15	2.00	2.00
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50
E. Summit, N. J.	2.10	2.35	2.15	1.80	1.85	.....
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
Millington and Paterson, N. J.	1.80	2.20	2.00	1.80	1.60	.....
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	.....
San Diego, Calif.	.....	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40	.....
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**
Mayville, Wis.	**.90@1.00**	**1.10@1.25**	**1.10@1.25**	**1.10@1.25**	**1.10@1.25**	**1.10@1.25**
Middlebrook, Mo.—Granite	4.00	.....	2.00	.....	.....	1.50‡
Portland, Maine—Granite	**1.50**	.....	.....	**1.35**	**1.25**	.....
Roseburg, Ore.	.....	**1.50**	**1.25**	**1.05**	**1.00**	**1.00**
Stockbridge, Ga.—Granite	**.50**	**2.00**	**1.90**	**1.75**	**1.75**	.....
White Haven, Pa.—Sandstone	**.85**	**1.20**	**1.40**	**1.20**	**1.20**	**1.20‖**
Granite	1.25	.....	1.50	1.50	1.50	.....

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:	
Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$—70% thru 200-mesh, 95% thru 40-mesh; bags, $5.00; bulk	**3.25**
Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); sacks, 4.00; bulk	2.50
Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk	**3.25**
Grove, Md.—(50% thru 50 mesh); paper bags, 6.75; bulk	5.00
Hillsville, Pa.—Analysis, $CaCo_3$, 96% (70% thru 100 mesh); sacks, 4.50; bulk	**2.75**
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	**2.25**
Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk	1.75
Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk	**2.75**
West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
Williamsport, Pa.—Analysis, $CaCo_3$, 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); bulk	4.00
CENTRAL:	
Alden, Ia.—Analysis, $CaCo_3$, 99.16%; bulk	**.80**
Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—50% thru 4 mesh	**2.50**
Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, equivalent 99.3%	2.00
Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh	**1.00**
Columbia, Ill., near East St. Louis (⅛" down)	**1.25@1.80**
Ellettsville, Ind.—Analysis, Carbonate, 98%	**2.00**
Elmhurst, Ill.—(Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh	**1.25**
Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Kansas City—(50% thru 50 mesh)	**2.00**
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$	2.00
Marblehead, O.—(Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 4.75; bulk	2.75
McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04%—100% thru ¼-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100	1.50
Milltown, Ind.—Analysis, $CaCo_3$, 94%; $MgCo_3$, 3%—(100% thru 4 mesh)	1.50
Montrose, Ia.—(90% thru 100 mesh)	1.25
Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh; bulk, 3.50; paper sacks	5.50
Rockford, Ill.—Analysis, $CaCo_3$, 54%; $MgCo_3$, 42%	1.25
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ⅛" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82%	2.00
St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12%	1.50
Stone City, Ia.—Analysis, $CaCo_3$, 98% (50% thru 100 mesh)	**.80**
Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen)	1.80
Whitehill, Ill.—Analysis, $CaCo_3$, 96.12%; $MgCo_3$, 2.50%—50% thru 100 mesh	2.00

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96% combined carbonates—All thru 10 mesh with all dust in 2.75

Claremont, Va. (Marlime) — Analysis, 90.94% $CaCo_3$, 0.31% P., 1.36% Mg., 0.37% K.; bulk 4.50
100 lb. ppr. bags 6.00
100 lb. cloth bags 6.50

Dittlinger, Tex. — Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%.
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh 2.50

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk 2.00

Linnville Falls, N. C. — Analysis, $CaCo_3$, 54%; $MgCo_3$, 42%—50% thru 100 mesh; sacks, 4.00; bulk 2.50

Marion, Ga.—Analysis, 90% $CaCo_3$—(50% thru 100 mesh) 2.00

Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%); average price, ⅛ in. down 2.00

Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.
(80% thru 100 mesh) 3.00
(All thru 10 mesh) 2.50
(80% thru 200 mesh) 5.00
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Mountville, Va.—Analysis, $CaCo_3$, 76.6%; $MgCo_3$, 22.8%—100% thru 20 mesh; sacks, 6.00; bulk 5.00

Ocala, Fla. — Analysis, $CaCo_3$, 98%—(75% thru 200 mesh) 4.50

Tyrone, Ky.—Analysis, $CaCo_3$, 90%; $MgCo_3$, 4%—90% thru 4 mesh ..... 1.75@2.25

Winnfield, La.—(50% thru 50 mesh) 3.00

WESTERN:

Cement, Calif.—50% thru 50 mesh 4.00

Colton, Calif.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1½% (all to pass 14 mesh) —bulk, 3.50; bags 4.50
Sacks, 15c extra, returnable.

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 1.35

Terminous, Calif.—Analysis, 94% $CaCo_3$, 1.4% $MgCo_3$—(60% thru 200 mesh; 90% thru 100 mesh; 100% thru 40 mesh); sacks, 6.00; bulk 5.25

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. ..... 2.50@3.00
Special hand selected rock 3.50
Tridgeton, N. J. 2.00
Cedarville and South Vineland, N. J.—
Glass, damp 3.00
Glass, dry 3.50
Gray Summit, Mo. ..... 2.50@3.00
Guion, Ark.—Carlots 2.50
Hancock, Md.—Damp 2.00
Klondike and Pacific, Mo.:
Contracts 2.00
Carlots 3.00
Mapleton, Pa.—Dry 3.50
Glass, damp 2.75
Massillon, Ohio 3.50
Michigan City, Ind. ..... .75
Millington, Ill.—Contracts 2.00
Mineral Ridge, O. 3.50
Montoursville, Pa.—Green, washed ..... 2.00@2.75
Oregon, Ill.—Large contracts 2.00
Open market 2.50
Ottawa, Ill. ..... 2.00@2.50
Robinson, Md., washed, screened, not dried 2.00
St. Marys, Pa.—Green 2.50
Sands, Elk Co., Pa.—Selected, green.. 3.00
Thayers, W. Va.—Washed 3.50
Dried 4.00
Tygarty, Ky.—Washed, not dried 2.60
Utica, Ill. ..... 1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—Core ..... 1.25@2.00
Furnace lining ..... 2.25@2.50
Molding, fine coarse and brass ..... 2.50@2.75
Sand blast ..... 3.75@4.50
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse 1.50
Arenzville, Ill.—Molding fine ..... 1.75@2.00
Beach City, Ohio—Core 2.75
Furnace lining and sand blast 3.00
Molding fine and coarse ..... 2.50@3.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point.

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		1.30		1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Farmingdale, N. J.	.68	.48	1.50	1.35	1.35	1.30
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50@ .60	1.75@2.00	1.50		1.35
Ludlow, Mass.	.75*	.75*			1.50*	1.50*
Washington, D. C.	.75	.75	2.00	1.40	1.20	
CENTRAL:						
Alton, Ill.	.60@ .75	.60@ .75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.		.60@ .70		1.25@1.50		1.00@1.20
Attica, Covington, Silverwood, Ind.	.85	.85	.85	.85	.85	.85
Barton, Wis.	.85	.70	1.00	.80	.80	.80
Chicago, Ill.		1.40	1.50			
Columbus, Ohio		.70	1.00	.70	.70	.70
Des Moines, Ia.	.75@1.00	.75	1.65	1.65	1.50	1.50
Earlestead (Flint), Mich.	.60	.70		1.05	.95	.95
Eau Claire, Wis.	.70	.70	1.35		1.20	
Elgin, Ill.		.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	1.00	.70	1.00	.84	.84	.84
Grand Rapids, Mich.		.60		.90	.83	.83
Greenbush, Mich.	.50	.80	1.00	1.25	1.25	
Greenville, Mechanicsburg, O.	.70@ .80	.60@ .70	.60@ .70	.70@ .80	.60@ .70	.60@ .70
Humboldt, Ia.	1.00	.85	1.90	1.90	1.90	1.90
Janesville, Wis.		.65			.75	
Le Mars, Ia.		.90		1.60	1.60	
Mason City, Ia.	1.00	.90	2.00	1.85	1.85	1.75
Milwaukee, Wis.	1.20	1.20	1.30	1.30	1.30	1.30
Minneapolis, Minn.	.50	.50	2.00	2.00	1.75	1.50
Moline, Ill.	.80	.80		1.20	1.20	1.20
Oxford, Mich.			(60-40 mix, .95 per ton)			
Pittsburgh, Pa.			(Sand, 1.30; gravel, 1.00)			
Riton, Wis.		.65	.75			
Saginaw, Mich., f. o. b. cars	1.30	1.30	2.20	1.95	1.85	1.85
St. Louis, Mo., f. o. b. cars	1.55		1.75	1.55		1.50
Terre Haute, Ind.	1.00	1.00		1.00	1.00	1.00
Toledo, Ohio	.75	.75				
Winnipeg, f. o. b. cars			2.00 per cu.yd.			
Yorkville, Moronts, Oregon and Sheridan, Ill.	.80	.80@ .90	.90	.80@ .90	.80@ .90	.70@ .80
SOUTHERN:						
Knoxville, Tenn.	1.25	1.25	1.50	1.60	1.60	1.60
Lake Weir, Fla.		.75				
Lincoln, Neb.	.90	.90	2.20	2.20		
Macon, Ga.		1.00				
Memphis, Tenn.	1.40	1.40	1.50			1.50
N. Martinsville, W. Va.		1.10			1.00	
New Orleans, La.		1.40*	3.00*			
Pelzer, S. C.	.80					
Pine Bluff, Ark.	1.25	.95	Concrete gravel, all sizes, 2.00			
Pueblo, Colo.	.95*	.75*			1.50*	2.00*
Roseland, La.		.35			1.25	
Tulsa, Okla.		.70				
Waco, Texas	.70@ .80	.70@ .80				1.10
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.			(Kaw River sand, car lots, .75 per ton, Missouri River, 1.50)			
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Seattle, Wash.	1.25	1.25	2.00	1.25	1.25	1.25
Vancouver, B. C.		1.30*		1.30*		1.20*
Yorkville, Ore.	.60	.60@ .75	.70	.60@ .75	.60	.50@ .60

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@ .85	.60@ .80		1.00	.90	.90
Fishers, N. Y.		.90@1.00				1.00
Hartford, Conn.	1.00*					
Yardville, N. J.		.50@ .75				
York, Pa.		1.20@1.30		(crushed rock sand)		
CENTRAL:						
Earlestead, (near Flint, Mich.)			.60 per yd.			
Elkhart Lake, Wis.			.75 per ton (washed concrete material)			
Ft. Jefferson, Mechanicsb'g, O.	.70	.60	.60			
Grand Rapids, Mich.		.40		.75	.80	.60
Greenbush, Mich.	.65					
Hersey, Mich.			.70	.70		
Illinois, Northern						.50@ .60
Janesville, Wis.			All grades in box cars, 1.00			
Lincoln, Neb.			Sand gravel mix, 1.30			
Oxford, Mich.			Including cobbles, $1.00 per yd.			
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo., f. o. b. cars						1.60
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Toledo, Ohio					.75	
Yorkville, Oregon, Moronts and Sheridan, Ill.		.70@ .80			.70	
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dudley, Ky. (Crushed Sand)		1.05		1.00		
Lindsay, Tex.						.50@ .75
Valde Rouge, La.						.60@ .75
Waco, Texas						.95
WESTERN:						
Pueblo, Col.			River Run, .75* unscreened			
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ore.		.40			.40	

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.00	1.00	1.00		1.00	1.00	1.00
E. Canaan, Conn.	4.00	1.10	2.00	1.50	1.50	1.35	
Erie, Pa.		1.25	1.25		1.25	1.25	1.25
Emporium, Pa.		1.25	1.25		1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	1.20	1.50	1.20	1.20	1.25	1.25
Pittsburgh, Pa., Dist.	2.05	1.15	1.50	1.15	1.15	1.15	1.15
Sharpsville and Struthers, Pa.	2.00	1.20	1.60	1.20	1.20	1.20	1.20
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ensley, Ala.	2.05	1.00	1.10	1.25	1.25	1.00	.95
Ironton, Jackson, O.	2.00	1.25	1.60	1.25	1.25	1.25	1.25
Toledo, O.	All sizes, 2.00, F. O. B. Toledo						
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.20	1.60	1.20	1.20	1.20	1.20
SOUTHERN:							
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00		1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.			98	38	8.00
Bellefonte, Pa.	8.50		98.5	.72	11.50
Berkeley, R. I.		14.00	.50	.18	
Bridgeport, Pa.	7.50@9.00		55	44	9.00@11.00
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Pa.	6.00@6.50		78.67	1.33	
Farnams, Mass.	6.00	7.50	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.		8.00	85	2	
Hollidaysburg, Pa.	5.50@7.50		94.68		
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	8.00	10.75			10.75
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	8.50		73	1	10.75
Williamsport, Pa.	6.50		62-68	2-3	11.00
West Rutland, Vt.	5.00	8.00	68	3	
York, Pa.	8.00		90-95	2-7	10.75
CENTRAL:					
Alton, Ill.	10.50		94.0		
Delaware, O.			50.0	5-12	10.50
Knowles and Valders, Wis.	4.00	9.00	55	45	13.00
Manistique, Mich.	11.00		95	2	11.00
Marblehead, O.	3.00	5.25			13.00
Mitchell, Ind.					13.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Springfield, Ohio			30.68	33.34	13.00
Woodville, Ohio			46-50	30-35	13.00
SOUTHERN:					
Blowers, Fla.	5.50	8.00	98.0		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	9.50		97.82	0.12	
Knoxville, Tenn.					14.00
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	6.00		34		6.50
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	9.00	11.50	80.00	15.00	
WESTERN:					
Colton, Calif.	4.50		97	2	15.00
Kirkland, N. Mex.	12.50				
San Francisco, Calif.			96	0.33	15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core	1.30@1.50
Molding, coarse	2.00@2.40
Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	2.50
Brass molding	2.50
Molding fine	2.00@2.50
Core	1.50@2.00
Columbus, O.—Core	1.00
Brass molding	2.50
Furnace lining	2.50
Molding fine, steel molding	2.50
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding, coarse	1.90
Brass Molding	2.15
Eau Claire, Wis.—Core	.70
Roofing gravel	2.25
Sand blast coarse	3.50
Sand blast medium, fine	3.00
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Molding fine, steel molding	2.50
Molding coarse, fine, green	2.25
Sand blast	5.00
Core	2.50
Greenville, Ill.—Molding coarse red	1.75@2.25
Guion, Ark.—Molding fine	2.00@2.25
Roofing	3.00
Stone sawing	2.50
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.85
Klondike and Gray Summit, Mo.—Molding fine	2.00@2.50
Lake Weir, Fla.—Sand blast	.60
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, moulding, fine and coarse, dry	3.00
Massillon, O.—Molding fine	3.00
Molding coarse	3.00
Traction	3.00
Furnace lining	3.50
Core	3.00
Michigan City, Ind.—Core, bank	.75
Traction	.50
Millington, Ill.—Core and furnace	2.50
Core, washed	1.50
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.50@3.00
Glass sand	3.50@4.00
Montoursville, Pa.—Traction	1.50@2.00
Brass molding, fine, core	1.75@2.25
Glass sand	2.00@2.75
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Oregon, Ill.—Core, furnace lining, molding fine, brass molding	2.50
Sand blast, molding coarse	3.50
Ottawa, Ill.—Crude silica sand	1.00
Providence, R. I.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.25
Sand blast	3.00@4.00
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
Thayer, Pa.—Traction	2.00
Furnace lining, molding, coarse	1.20
Molding, fine	1.50
Core, washed	2.25
Core, green	2.00
Glass sand, green	2.50
Glass sand, washed	3.00
Tygarty, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	2.00
Molding fine	2.50
Molding coarse, traction	2.50
Brass molding	2.50
Sand blast	3.50
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	3.00
Core, furnace lining, molding fine and coarse (green)	2.50
Wedron, Ill.—Core (crude silica)	1.00
Molding fine, coarse	1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio—Molding fine	2.25@2.50
Molding coarse	2.00@2.25

Crushed Gypsum

Castalia, O.—Crushed, to cement mills	3.50
Ft. Dodge, Ia.—Bulk	3.50
Grand Rapids, Mich.—Crushed gypsum rock	4.50
Gypsumville, Man., Can.—Crushed	3.50

(Gypsum) Land Plaster

Castalia, O.—Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00.	
Garhutt, N. Y.—Land plaster, bags	7.50
Grand Rapids, Mich.—Ground gypsum rock	8.50
Oakfield, N. Y.	7.50
Sandusky, O.	6.00
Jute, 3.00 extra; ppr., 1.00 extra.	

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 65%	8.25
B. P. L., 70%	9.00@10.00
Brown rock, 75% and better	12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	6.00
B. P. L., 65%	7.30
B. P. L., 70%	8.50
B. P. L., 75%	12.00
Lump rock, long ton, 70%	9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%) 13% phosphorus	7.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	7.00@10.50
Norwills, Fla.—Fla. Hard Rock (B. P. L., 77%	13.50
Wales, Tenn.—(95% thru 100 mesh) (guaranteed 14% phosporus equiv.)	8.50@9.00
Walls, Tenn.—B. P. L., 70.2%—	
To County Agri. Assns.	7.50
To others	7.75

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Phoslime, Fla. (in burlap bags)	15.00

Passed By The Screens

Incorporations

The **Chicago and Bloomington Stone Co.**, Bloomington, Ind., has increased its capital stock from $100,000 to $300,000.

The **Cedar Park Stone Co.**, Leander, Tex., has been incorporated for $7,000 by T. L. Allen, G. T. Allen and A. R. Allen.

The **Tri-City Stone Co.**, Illmo, Mo., capitalized at $25,000, is being organized to manufacture limestone fertilizer and crushed rock.

The **Producers Granite Co.**, Llano, Tex., has been incorporated for $50,000 by William Green, Philip Welhausen and J. W. Cearley.

The **St. Paul Sand and Gravel Co.**, St. Paul, Marion County, Ore., has been incorporated for $5,000 by W. M. Murphy, George Hiller and J. E. Smith.

The **Eaton-Kaster Gravel Co.**, Indianapolis, Ind., has been incorporated for $12,000. The directors are Arthur E. Eaton, Robert C. Kaster and William H. Tudor.

The **National Tech Stone Co.**, Indianapolis, Ind., has been incorporated with a capital of $100,000 by Joseph F. Clapka, Jacob Miller, Elmer J. Binford, all of Indianapolis.

The **Richville Limestone Co.**, Watertown, N. Y., to quarry and crush limestone, has been incorporated for $30,000 by C. W. Campbell, F. C. Ash, and D. W. Balmat, of Carthage, N. Y.

The **Logansport Stone and Lime Co.**, Logansport, Ind., has been incorporated for $250,000 to produce and sell lime and limestone, by Peter Martin, Jacob Dick and Wesley W. Hawley.

The **North Texas Rock Co.**, Fort Worth, Tex., has been incorporated for $1,000,000 under the laws of the State of Delaware. C. D. Mims, Austin, Tex., is the present representative of the company in that state.

The **West Wisconsin Limestone Co.**, Neillsville, Wis., has been incorporated for $75,000 to quarry, crush, grind, and manufacture limestone products. The incorporators are George L. Jacques, W. H. Jacques and James T. Jacques.

The **Natural Rock Asphalt Corporation**, Wilsington, Del., has been incorporated to acquire, hold, develop, and improve mineral lands, etc. The incorporators are C. H. Blaske, M. A. Bruce and S. E. Dill of Wilmington. The capital is $850,000.

The **Dorchester Fertilizer and Limestone Co.**, Cambridge, Md., has been incorporated to manufacture fertilizer and lime. They will also install machinery to crush oyster shells for poultry food. Lloyd Webster is president and treasurer; Ivy Andrews, secretary.

The **Darling Phosphate Co.**, Chicago, Ill., has been incorporated under the laws of Illinois for $40,000. This company has recently bought a large acreage of phosphate land near Centerville, Tenn., and intends to add to its holdings by acquisition of land in other parts of the state.

The **Burress Gravel Co.**, Shoals, Ind., has recently been incorporated to operate a large gravel deposit at that point. The new company has applied to the State Public Service Commission for an order to compel the Baltimore & Ohio Southwestern Ry. to construct a siding to the deposit.

Fulton, Mo., reports state that Garnet Forney, an attorney of Detroit, Mich., has been in Fulton preparing articles of incorporation for a $50,000 company to quarry and crush limestone for commercial crushed stone and agricultural limestone. The proposed corporation has already acquired leases for approximately 1,200 acres of quarry land near Fulton.

The **Marquette Stone Products Co.**, Marquette, Iowa, has been incorporated for $100,000 to quarry, produce and sell crushed stone, sand, gravel and other building materials, and the manufacture of concrete products, etc. The officers are: President, John Kramer; vice-president, W. F. Bickel; secretary, J. M. Berry, and treasurer, Ernest Nicholson, all of Marquette.

The **River Sand Co.** has been organized at Topeka, Kan., with a dredging plant just west of the Rock Island Ry. yards. O. W. Knight, formerly with the Topeka Sand Co., is general manager of the new enterprise and will supervise the construction of the new plant. Several prominent business men of Topeka are affiliated with the new company, which will soon apply for a charter.

Quarries

The **Weldon Spring Rock Quarry**, St. Charles, Mo., has embarked upon a new enterprise. They are now grinding up limestone as a fertilizer and selling it at $2 a ton to farmers. County Agent Nicholson says there is little land in this county but what needs liberal quantities of lime. The wheat yield can be materially increased by such a treatment. The average treatment will require two tons to the acre.

The **Kaw Rock Crushing Plant**, Junction City, Kan., has been sold to Victor L. Philips, of Kansas City, Mo., who will move it to Leavenworth, where it will be used for federal aid road projects in that country. The plant was opened some ten years ago by George and Frank Flower, of this city, and in addition to supplying most of the rock used in local paving, the firm has shipped more than 3,000 cars of rock to other towns. The payroll has averaged $18,000 a month. During the past years the firm has had a continual fight to keep men on the job, and has been unable to secure cars for shipping to other towns.

Bluefield, W. Va.—Several prominent farmers of the county have formed an association to be known as the Mercer County Limestone Association. The purpose of the organization is to establish two limestone crushers and plants in the county for the purpose of furnishing agricultural lime. It is understood that one of the plants will be constructed on the John L. Shelton farm north of this place, and the other possibly on the Sand Lick road near the Walker farm. Both quarries are said to be of fine lime and in quantities almost inexhaustible. The county court is lending its aid in the matter and has promised to permit the association to use one of its large crushers at one of the plants.

Cement

E. Struckman has resigned as superintendent of the Hawkeye Portland Cement Co. of Des Moines, Iowa, and has taken charge of the construction and later the operation of the Pyramid Portland Cement Co., also at Des Moines, as vice-president and general manager. The new company is just beginning to break ground.

The **Western States Portland Cement Co.**, Kansas City, Mo., is about to begin construction work on its new plant near Bettendorf, Iowa. A. D. Stancliff, general superintendent of the company, has been devoting practically all his time since coming to Davenport to the problem of obtaining sidings for the corporation. When the switch tracks are laid the material and machinery for the new plant will be shipped to the location. Work of erecting a modern cement factory will then be started and will be rushed to completion. It is expected that before the building season ends excellent progress will have been made on the new enterprise. The Bettendorf plant will be as large as the company's mill at Independence, Kas., which has a capacity of 3,000 barrels a day. A crushing mill, a pulverizing mill, a wet process and a dry process are among the main structures which will be built here. Just when building would commence Mr. Stancliff said he did not know definitely. It was intimated, however, that the initial building operations will commence this summer. It is expected that the big plant will be in operation by January 1.

Bettendorf, Iowa—Reports state that a Chicago concern has secured an option on the 400 acres of the Dodge farm at an agreed price of $800 per acre. The company is now drilling on the site and tests made so far are declared to be most satisfactory. If all conditions are found favorable, it is proposed to erect a mammoth cement works on the site. This plant also will cost into the millions. The Dodge farm is owned by Reuel B. Cook and Helen Sampson, nee Helen Dodge. It has been erroneously announced that the Western States Company which now proposes to locate east of Bettendorf, had at one time had an option on the Dodge farm and had started drilling there. The Western States Company did negotiate for an option and offered $600 per acre for the property. The owners held out for $800. On account of the disagreement in the price, the proposed option was never signed and although the company had brought its drilling outfit into Buffalo on the railroad, it was never unloaded and consequently no drilling was done by them on the Dodge farm. The Western States Company thereupon moved its field of endeavor to the Nutting, Fenno, and Abel farms east of Bettendorf where they secured land at considerably less than $500 per acre. A preliminary organization has been formed, known as the Davenport Portland Cement Co., for testing the rock on the Dodge farm. It is capitalized at $150,000, the incorporators being E. L. Cox of Chicago, Reuel B. Cook and M. E. Ochs of Davenport. This corporation does not reveal the big interests back of the project.

Sand and Gravel

The City of Spokane, Wash., has purchased a gravel deposit within the city limits and will operate a municipal sand and gravel plant.

The Columbia Contracting Co., Portland, Ore., one of the large Columbia River sand and gravel operators, has been awarded a contract for furnishing 1,100 cu. yds. of sand and 2,200 cu. yds. of gravel for municipal terminal No. 4. The price on the sand is $1.45 a cu. yd., and $1.55 a cu. yd. on the gravel.

The Hahn-Muscatine Gravel Co., Muscatine, Iowa, has commenced work on its new $50,000 sand and gravel plant. A feature of the new plant's construction will be its heating system, which permits its operation the year round. Heat obtained from the retortures in the Newmann process will be utilized to keep the plant at a temperature which will permit the screening and washing of sand and gravel during the winter months while the other plants of the city are closed.

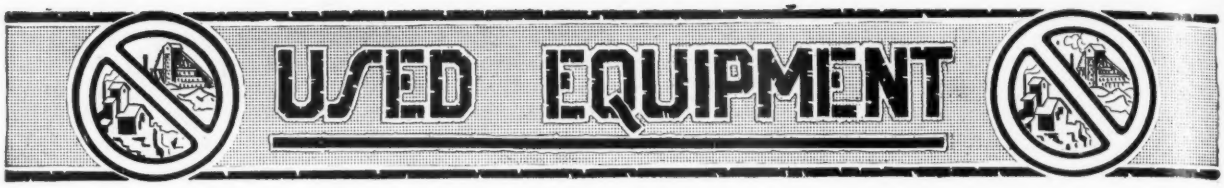
The Anaconda Gravel Co., Fort Worth, Tex., has completed its $40,000 electrically operated washing and screening plant for sand and gravel and it is expected that the plant will be in operation in a very short time. John B. Hawley, president of the company said that there is enough gravel in the pit to supply Fort Worth's needs for the next ten years. Gravel and sand will be delivered to builders in the company's trucks. No outside shipments are contemplated, as the city's requirements will be sufficient to keep the plant running to its capacity of 250 cubic yards of washed and screened material a day. There will be two bins for gravel, the one for coarser grade having a storage capacity of 60 cubic yards, and the one for the finer grade being built to hold 40 cubic yards. The sand bin will have a capacity of 30 cubic yards. As consulting engineer for the General Construction Company, Mr. Hawley discovered the great need for such a plant in Fort Worth. The city has been dependent partly on outside sources of supply and the acute shortage of railway equipment will make it almost impossible to obtain a sufficient amount of crushed stone for Fort Worth's building projects for several months to come. The other Texas plants are located at Grand Prairie, Waco and Texarkana. All have more orders than they are able to fill and there is no prospect of a lessening of the demand.

Gypsum Products

The Ebsary Fireproofing & Gypsum Co., New York, has filed notice of change of name to the Ebsary Gypsum Co. Offices are at 140 W. Forty-second Street.

The Connecticut Adamant Plaster Co., New Haven, Conn., suffered a loss of several thousand dollars on July 15 when its wharf and bunkers were destroyed by fire.

Fort Dodge, Iowa—The gypsum rock mines of the various companies here voted on July 17 to continue their strike, which has been in effect since July 1. They insist that their original demands for 5 cents an hour more than the companies have offered be granted. The companies say they will not give it. Fourteen hundred men are out of work as a result of the strike of 300 miners, the balance being top mill workers who cannot work while the mines are not in operation.



Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059

1—Model 70 Marion, 2½-yd. dipper, Shop No. 2693.

1—Model O Thew, ½-yard dipper, full revolving, on traction wheels.

Hoisting Engines

1—8½ x 10 DC 2-D Lambert, with boiler

1—6 x 10″ DC 2-D Byers.

1—6¼ x 10 DC 2-D Mundy, with attached swinger and boiler

Cableway

1—Lidgerwood Cableway, 1164-ft. span, with 9 x 10″ DC Reversible Link Motion Cableway Engine, 3-ton capacity

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

1—14 x 20″ standard gauge saddle tank Locomotive.

2—American 10 x 16″ Locomotives, 36″ gauge, with butt joint boilers

4—18-ton 10 x 16″ Dinkeys, 36″ gauge

Clam Shell Buckets

1—1½-yard Browning.

Cars

20—12-yard Western Air Dump, standard gauge, 26 ft. bed.

H. KLEINHANS COMPANY

Union Arcade **Pittsburgh, Pa.**

Dredges—Sand and Gravel Machinery

Now Ready for Delivery

12″ Morris extra heavy dredging pump arranged for electric drive.

3 drum Flory hoist directly connected to 10 H.P. motor, complete with control.

1½″, three stage Morris centrifugal priming and general service pump directly connected to 5 H.P. motor.

These three pieces comprise the essential equipment for a 12″ electrically driven suction dredge. This equipment is of the latest design and of very rugged construction. The pieces have never left the manufacturer's shop and are now on the floor ready for immediate shipment. This is the only opportunity to get new equipment of this sort in less than five months' delivery. Plans for hull and machinery arrangement can also be furnished.

Used Equipment

1-10″ patented Morris manganese lined, belt-driven dredging pump suitable for pumping coal, sand, gravel or tailings.

Pierce J. McAuliffe, 17 Battery Place, New York City

Hyman Michaels Co.

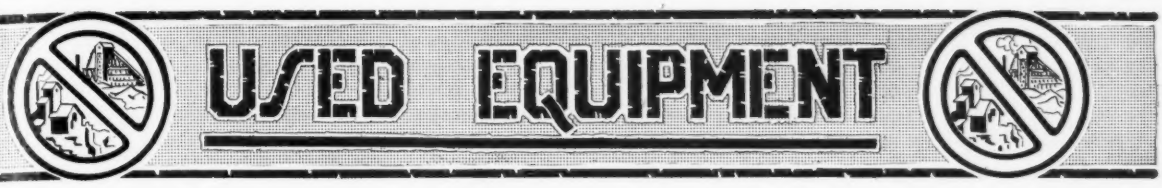
People's Gas Building
CHICAGO, ILL.

New and Relaying Rails

Iron and Steel Scrap

Write or wire us when in the market to buy or sell

New York Pittsburgh St. Louis



WE BUY—REBUILD—SELL or RENT

All the equipment listed below is owned by us and may be inspected in one of our own warehouses

CARS

24—1½ yard V shape 24" gauge Kopple cars, practically brand new; used less than one month.
12—Same as above with brakes.
12—1 yard V shape 24" gauge Kopple cars, excellent condition.
2—End dump Kopple cars, 18 cu. ft. capacity, 24" gauge.
2—Kopple 3'x5' flat cars, 24" gauge.
1—Kopple 24" gauge hand car.

CLAMSHELL BUCKETS

1—½ yard Standard.
6—¾ yard buckets following makes; Obenberger, Aden, Standard. Owen.
9—One yard buckets, following makes:
1 Owen, type L.
2 Owen, type E, one with teeth, one without teeth.
1 Heyward.
1 Mead Morrison.
2 O. & S.
1 Standard
1 Kiesler
2—Heyward, 1¼ yard.
2—Heyward Orange Peel, capacity ¾ yard.
1—Heyward Orange Peel, capacity 1 yard.

BOILERS

1—150 horse power locomotive type.
1— 75 horse power locomotive type.
1— 50 horse power locomotive type.
1— 25 horse power locomotive type.
21—Small Vertical Boilers from 6 H.P. to 12 H.P.

CRANES

1—12½ ton, 4 wheel Browning Locomotive Crane with 40 ft. boom, bucket operating, just like new.
2—15 ton, 4 wheel O. & S. Locomotive Crane with 40 ft. boom, bucket operating.
2—Byers Auto Cranes on traction wheels with 30 ft. boom, with or without buckets.

HOISTS

1—10x12 D/C 3 drum Lidgerwood with boiler.
1—9x10 D/C D/D Lidgerwood with boiler with 4 Independent clutch winch heads.
1—10x12 D/C D/D Lidgerwood skeleton.
10—8¼x10 D/C D/D with boiler, following makes: American, Lidgerwood, Clyde, Lambert, Flory, Reliance, Mundy and National.
55—Hoists, from 7x10 to 4¾x6, all makes.

LOCOMOTIVES

2—Davenport 24" gauge, 7½ ton saddle tank.
1—Vulcan 9x14, 36" gauge saddle tank.
1—Porter, 18 ton, saddle tank, 36" gauge.

PUMPS

1—Morris Centrifugal, 10 in. suction, 10 in. discharge, direct connected steam engine.
2—Morris Centrifugal Pumps, 6" suction, 5 in. discharge, direct connected steam engine.
1—Fairbanks-Morse Centrifugal 5" suction, belt driven.
5—Domestic Force Pump, 3 H.P. gas engine.

The above is only a partial list of our enormous stocks—we have Concrete Mixers, Derricks, Rollers, Pavers, Rail and Track, Steam Shovels, etc.

EQUIPMENT CORPORATION OF AMERICA

Chicago, 1419 Lumber Exchange Bldg.

Philadelphia: Land Title Bldg. **Pittsburgh: Empire Bldg.**

Machinery For Sale

One complete Rock Crushing Plant.

DRYERS—Direct-heat rotary dryers, 3x25 ft., 3½x25 ft., 4x30 ft., 5x35 ft., 5½x50 ft., 6x50 ft. and 7½x60 ft.; double shell dryers, 4x20 ft., 5x30 ft. and 6x35 ft.; steam-heated air rotary dryers, 4x30 ft. and 6x30 ft.

KILNS—Rotary kilns, 8x60 ft., 6x60 ft., 3½x25 ft. and 3x25 ft.

MILLS—24-in., 22-in. and 16-in. Schutz-O'Neill mills; 6x5-ft., 2½x3-ft., 3x3½-ft. pebble mills; 5x3½-ft., 6x6-ft., 5x4-ft., 4½x3½ and 2½x2¾-ft. ball mills; 3-ft. Marcy mill; 33-in. and 24-in. Fuller-Lehigh mills; 4½x20-ft., 5x11-ft., 5x22-ft. and 6x20-ft. tube mills; 20x13-in., 9x12-in., 7½x13-in., and 7x10-in. jaw crushers; one type "A" and one No. 3 Williams' swing hammer mills; one Kent type "G" mill; one Aero pulverizer, type "D"; two 36-in. and one 42-in. cage mills; one 8-ft., two 4½-ft. and two 3-ft. Hardinge conical mills; 18x12-in., 20x12-in. and 30x10-in. roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; one 4-roll Raymond mill; one No. 5 Telsmith breaker; one 36-in. Sturtevant emery mill; four Giant Griffin mills; one Junior Griffin mill; one 51x14-in. chaser mill.

SPECIALS—Emerick 8-ft. separator; four 6x8 ft., four 6x6-ft. kominuters; one McDougal and one Wedge mechanical furnaces; five automatic package weighing machines; electric arc furnaces; jigs; one Keystone excavator; 6x8-ft., 6x5-ft. and 4x3-ft. Newaygo vibrating screens.

All this equipment is complete and in good condition.

W. P. HEINEKEN, Engineer
95 Liberty St., New York City. Tel. Cortl. 1841

For 48 pages of unusually good bargains in

CRUSHERS

Compressors, Boilers, Hoists, Rails, Cars, Locomotives, Quarry Equipment, etc.

Write for our Latest Big Bulletin.

ZELNICKER IN ST. LOUIS

FOR SALE

TUBE MILLS

2—6"x22' Power & Mining Tube

KENT MILLS

4—Kent Mills.

WILLIAMS MILLS

2—No. 3 Universal Williams Mills.

FULLER MILLS

2—42" Fuller Mills.

CRUSHER

1—No. 8 Allis-Chalmers Crusher.

Central Machinery & Supply Co.
Iola, Kansas.

FOR SALE

1—Gates No. 5 type "K" Gyratory Crusher, standard back drive, extra new pinion, chilled iron fitted, excellent condition. Also all sizes Jaw and Gyratory Crushers, all types, capacities Pulverizers.

J. F. DONAHOO CO.
BIRMINGHAM, ALABAMA

CONTRACTORS

16 CABLEWAY EQUIPMENTS

12—7x10 double drum Stroudsburg engines fitted with link motion. Drums 24"x24" with rear one having concave ends for transversing line.
10—Oregon Pine Masts 72' to 92' long. Average dia. 17".
50,000' ⅝" 6x10 C. S. Wire Cable.
15,000' 1⅛" 6x19 C. S. Hauling Wire Cable.
50,000' 1¼" 6x19 Cableway Wire Cable.

And all the Clips, Guys, Blocks, Shackles, Sheaves, Frames, etc., from the above plant. All this equipment is practically new and ready for immediate delivery. Inspection is welcomed.

4—Manning Vertical Boilers, 500 H.P., will insure for 175 lbs. Immediate delivery.

NEW BAR IRON

25 tons 1" x ⅝x5' to 6' long.
10 tons 1⅜"x1"x5' to 6' long.
10 tons 1⅜"x 1¼", full length.
5 tons 1¾"x⅜", full length.

Grout Boxes, Tanks, Rails, Second-hand Pipe.

The Perry, Buxton, Doane Company
214 West First Street, South Boston 27, Mass.

FOR SALE

6'x60' Rotary Kilns.
1—48"x26' Cummer Dryer, complete.
1—48"x45' Bonnot Dryer, complete.
1—Ingersoll-Rand Air Compressor, 8"x12".
2—8¼"x12" Marsh Pumps.
All in first class condition; prompt shipment.

Sharp & Lewis, Jonesville, Mich.

USED EQUIPMENT

For Sale

1 Crooker-Wheeler Generator
Size 76-S-6
75 K.V.A.
1200 R.P.M.
60 Cycle
240 Volts
3 Phase
180 Amp. Rheostat
Belt connected 9x15x9 to Westinghouse Compound Engine
Rated 75 H.P.

1 40 H.P. Brownell Engine
Automatic Governor

1 9x9 Vertical Westinghouse Engine
Rated 50 H.P.

1 75 H.P. Brownell Engine
Automatic Governor

1 8 H.P. Clark Vertical Steam Engine

2 25 H.P. Vertical American Blower Engines

1 15 H.P. Fairbanks-Morse Gasoline Lighting Engine

3 12 H.P. Hercules Gas Engines

Slater Construction Company
Pontiac, Michigan

STONE CRUSHERS

Offered for prompt inspection and shipment—

Two CHALMERS & WILLIAMS No. 6 Gyratory Crushers. Both standard rear drive. Have two arm spiders and suspended shafts. Smooth concaves, corrugated heads, of chilled iron. One never used, the other has seen but light service and shows no wear. Located in New Jersey.

We have many others—Gyratory Type from size No. 2 to No. 9. Jaw Type from 8x14 in. to 30x60 in. Also several Symons Disc Machines, Crushing Rolls, Pulverizers, etc.

Try us also for LOCOMOTIVE CRANES, STEAM SHOVELS, LOCOMOTIVES, CARS, RAILS, HOISTING ENGINES, DERRICKS, GRAB BUCKETS, AIR COMPRESSORS, CABLEWAYS, ETC.

Wm. B. Grimshaw Co., 1048 Drexel Bldg., Phila., Pa.
Dealers in USED but NOT ABUSED Machinery

Immediate Delivery

4—No. 6 GATES CRUSHERS

Reg. drive, nickel steel shaft, fine condition, extra manganese mantle, West. shipment.
1—No. 8 Gates reg. drive, Ohio ship.
20—Crushers, Nos. 2 to 10, mostly Gates.
9—150 H.P., 125 lb. H.R.T. Boilers, butt strap.
2—48"x12' Taylor Manganese Screens.
25—Air Compressors, 60 to 4,000 cu. ft.
1—9x8 Ingersoll-Rand steam.
1—427 cu. ft. Chicago pneumatic steam.
1—2400 ft. Sullivan two stage, also 3000 ft.
50—Steam pumps, boiler feed & service.
75—Steam and centrifugal pumps.
1—30-60 H.P. Emerson-Brantingham tractor, $1600.
1—No. 4 CRUSHING PLANT (A.C. motor drive). Concrete mixers—contractors' equipment. 3000 ft. Trac. Cable, ⅝" Roebling.

Send us your inquiries for electrical equipment, pavers, engines, hoists, etc.

Ross Power Equipment Co., Indianapolis Indiana

Standard Gauge Locomotives

1—30-ton four-driver saddle-tank American.
1—40-ton 17x24" four-wheel switcher.
1—50-ton 18x24" six-wheel switcher.
2—18-ton 10x16" 36" gauge Vulcans.
2—10-ton 7x12" 36" gauge Vulcans.
1—10-ton 36" gauge Shay geared.

Miscellaneous

1—Marion 76 steam shovel, No. 3503.
1—Monighan dragline, 120-ft. boom, 3½-yd. bucket.
1—Bucyrus dragline, 60-ft. boom, 2-yd. bucket.
13—16-yd. dump cars.
40—60,000-lb. capacity flat cars.
1—Western standard gauge spreader.
2—1-yd. Foote side-discharge concrete mixers.
50-lb. and 56-lb. rail, ties, 1½-yd. clamshell bucket, and 10-H.P. and 45-H.P. upright boilers. Railway Equipment, etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Bldg. Chicago, Ill.

FOR SALE

CRUSHED ROCK PLANT

Completely equipped Crushing Plant with Gates No. 6 Gyratory Crusher, Allis-Chalmers 18'-0" Log Washer, Rotary Screens, Steam Power Plant, Water Pumping Equipment, Blacksmith Shop, etc., together with eighty-three acres of Flint or Chert Beds, located near Attica, Fountain County, Indiana, and connected by siding to the main line of Wabash Railroad. Will be sold at a bargain to someone interested in the crushed rock business. Address

AMERICAN REFRACTORIES COMPANY
P. O. BOX 1122 PITTSBURGH, PA.

FOR SALE

One Section Pump made by F. E. Myers Bros., Ashland, Ohio.

One Rotary Fan Pump made by Gould Co., Chicago, Ill., No. 5597, size 4.

One 35 H. P. Engine made by Houston, Stanwood & Gamble Co., Cincinnati, Ohio.

One Ingersoll Steam Mining Drill with tripod.

300 feet 2½-in. Single Jacket Economy Underwriters labeled C. R. L. Fire Hose coupled in 50-ft. lengths, with three play pipes for same. This hose is brand new, never used. Address

Columbia Clay Company
Columbia South Carolina

FOR SALE

Complete equipment for washed gravel plant, capacity 14 cars a day, oil engines, crushers, screens, etc. Address

Box 1421 Care of Rock Products

USED EQUIPMENT

Do You Care to Save?
Try Us for Good Used

Crushers
Cranes — Cars
Locomotives — Rail
and all kinds of
Quarry Equipment

Reading Engineering Co., Inc.
154 Nassau St. New York

For Sale

One second-hand Keystone Steam Traction Well Drill, No. 3, in fine condition.

York Stone & Supply Co.
York, Pennsylvania.

PORTABLE TRACK

5000 feet, 20-lb. section, 24-inch gauge; six ties per 15-ft. section; strictly first class; some of it never used; immediate delivery. Curves, Switches, Cars.

E. C. SHERWOOD
50 Church St. New York
Rails—Steam Shovels—Locomotives

FOR SALE

2 13-ton Standard Gauge Whitcomb gasoline locomotives. Also have two steam driven air compressors, 365-ft. and 900-ft. capacity. Would like to exchange for electric driven compressor, of about 400-ft. capacity, driven by 440 volt motor.

The Casparis Stone Co.
Columbus, O.

Wanted

15 to 20 36-in. gauge 2-yard Koppel V-shape two-way side dump cars.

Must Be First-Class.

Box No. 1409 Care Rock Products

WANTED

Information and prices on 24"x36" to 48"x60" jaw or No. 12 Gyratory Crusher. Heavy duty chain elevator to match 48"x60" jaw crusher.

For Sale—1 9x15 Champion jaw crusher with truck.
1 Loomis Gasoline Blast hole drill.
1 Schaffer Spring balanced shaker screen 4'x14'.
2 Turnull 5-ton hauling wagons with beds.

John Herzog & Son, Forest, Ohio

New Rubber Belting

175 ft.	12" 8-ply	$1.66 per ft.
858 ft.	16" 8-ply	2.22 per ft.
1166 ft.	18" 8-ply	2.49 per ft.
407 ft.	20" 8-ply	2.76 per ft.
600 ft.	18" 6-ply	1.87 per ft.
500 ft.	10" 5-ply	.84 per ft.
494 ft.	6" 5-ply	.54 per ft.
465 ft.	5" 4-ply	.36 per ft.

CUT TO ANY LENGTH

National Belting and Salvage Co.
600 E. Water St., Milwaukee, Wis.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

For Sale

Dolomite, limestone, dolomite beach gravel. Drummonds Island, Chippewa County, Michigan. For fluxing iron ores, refining wood pulp, concrete rock, road material, etc.

W. F. COOPER
Box 584 Sault Ste. Marie, Mich.

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Situations Wanted

T. Nelson Dale

Geologist of the U. S. Geol. Survey and author of U. S. G. S. Bulletins on Slate, Granite and Marble, in view of the termination of his relations to the Survey by the "Retirement Act" on Aug. 20 of this year, will become a Consulting Geologist in problems pertaining to the quarrying of Slate, Granite, Marble, Lime-rock, and to the drilling for water.

Address: The Oaks, Springfield, Mass.

SITUATION WANTED

High grade quarry executive desires engagement. Thoroughly experienced in handling steam shovel and large production; efficient, energetic organizer. Connection with dependable and progressive company desired where results are appreciated. Address

Box 1414 Care of Rock Products

SITUATION WANTED

Quarry Superintendent with large experience in steam shovel operations, modern methods of blasting, crushing, etc. Good organizer and handler of labor. Can furnish best of references. Want situation where energy and efficiency will be appreciated.

Box 1422, Care of Rock Products.

Plants for Sale

FOR SALE

170 acre limestone property containing over 25 million tons of rock, analyzing better than 98% pure carbonate of lime.

J. F. KELLOGG
Avon, N. Y.

Situation Wanted

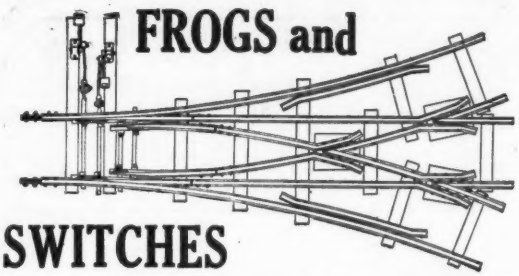
WANTED

By an engineer 34 years old to get in touch with reliable company or parties who can use and appreciate the services of a HIGH-GRADE, industrious man with 12 years' experience in the actual operation and management of large quarries and lime plants.

Am familiar with large operation embracing steam shovels, locomotives and big crushing units, besides production methods, cost data, the use of explosives and handling and organizing men.

Will be available in about two weeks. Address

Box 1415 Care Rock Products

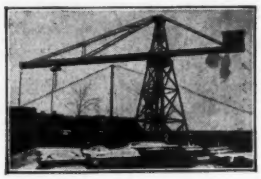


FROGS and SWITCHES

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

Locomotive Cranes



Special Cranes

Rotating Tower Cranes

Any Size or Capacity. Hand or Electrically Operated. Stationary or Traveling.

Let Us Know Your Requirements

The American Crane & Engineering Co.
Toledo, Ohio

PERFORATED SCREENS

MADE TO SUIT YOUR REQUIREMENTS

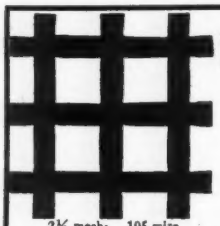
Let Us Quote Prices

Service and Quality

NORTMANN-DUFFKE CO
1200 27th Avenue Milwaukee, Wis.

SCREENS of All Kinds

Chicago Perforating Co.
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.



EVERY STEP

In the manufacture of

"Cleveland" Double Crimped Wire Cloth

is taken with one definite end in view

Service

A uniform fineness is assured by its use!

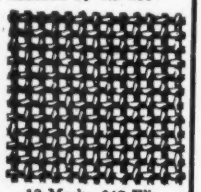
2½ mesh; .105 wire

Unequalled for the screening of

Sand, Gravel, Crushed Stone and Cement

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT.

The Cleveland Wire Cloth and Manufacturing Co.
3573 E. 78th Street, Cleveland, Ohio



1½ Mesh; .047 Wire

The New Jersey Wire Cloth Co.

CAN MEET YOUR REQUIREMENTS FOR PLAIN, SINGLE CRIMPED, OR DOUBLE CRIMPED WIRE CLOTH AND SCREENING.

MAIN OFFICE
616 SO. BROAD ST., TRENTON, N. J.

OFFICES AND STORES
NEW YORK, 210 FULTON ST.
PHILADELPHIA Near Hudson Terminal BOSTON
223-27 ARCH ST. 93-95 PEARL ST.

ROEBLING, N. J. — WORKS — PHILADELPHIA

PORTER LOCOMOTIVES
STEAM & COMPRESSED AIR
WRITE FOR CATALOGUE
H.K. PORTER Co.
Pittsburgh. Pa.

BACON-FARREL ORE & ROCK CRUSHING-WORLD KNOWN ROLLS-CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

Geo. B. Massey Company
Consulting Engineers

EXCAVATION

Opening up and economical development of stone quarries, sand, gravel and clay deposits.
Hydraulicking. Stripping.
Centrifugal pumping and hydraulic dredges.
Most suitable machinery and methods to insure lowest costs.
Design and construction of complete plants.
Engineering supervision.
Inspection of new and second hand machinery.

Booklet on excavating machinery on request

Peoples Gas Building, Chicago

Robert W. Hunt Jno. J. Cone Jas. C. Hallsted D. W. McNaugher

ROBERT W. HUNT & CO.

Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

New York CHICAGO Pittsburgh
St. Louis Kansas City Cincinnati San Francisco

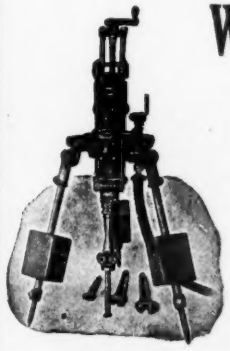
CRESCENT BELT FASTENERS

"Make Good Belts Give Better Service"

No part of the belt is weakened or cut away. A joint made with Crescent Belt Fasteners is a permanent one that outlives the most durable belt. The strain is evenly distributed across the entire width. They save time, trouble, money and belting.

Write for new Booklet N on Increasing Belt-Belting Efficiency.

CRESCENT BELT FASTENER CO.
381 Fourth Avenue, New York
Canadian Branch: 32 Front St., West, Toronto, Canada



Wood Drill Works

Paterson, N. J.

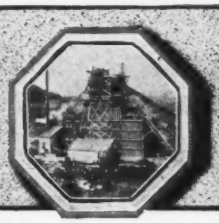
Rock Drills *and* Hammer Drills

All Sizes
And for All Purposes

J.C. BUCKBEE CO.

Engineers

First National Bank Building
CHICAGO



We solicit inquiries from those who contemplate constructing complete cement, crushed stone, agricultural stone, lime burning and gravel plants, or remodeling their present installations.

What we have done in putting other plants on an efficient, paying basis we can do for yours. Details are ready for your consideration.

Examinations, appraisals and reports made for purposes of finance and income tax returns.

We are prepared to finance meritorious properties.

James N. Hatch, C. E., M. E.

Member A. S. C. E.
CONSULTING ENGINEER
500 Old Colony Bldg., Chicago

Designs and Constructs

Complete Sand and Gravel Screening and Washing Plants.
Stone Crushing and Storage Plants. Conveying Systems.
Contractors' Material Plants
Electric Generating Plants and Transmission Lines.
Estimates and Plans Furnished

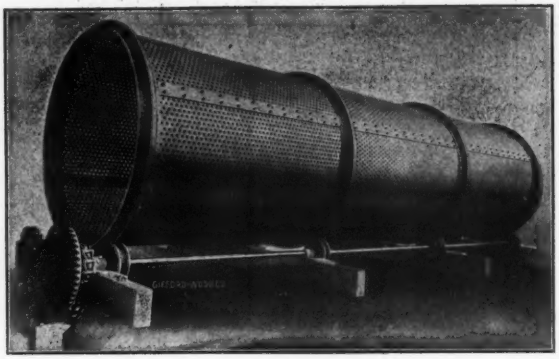
We Design and Equip Complete Plants

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.

Engineers, Machinists and Founders
Enterprise, Kansas



Screens of All Kinds
Also Conveying Machinery

for handling Crushed Stone, Gravel, Sand, Clinker and like materials.

You are invited to ask our cooperation at any time—preferably RIGHT NOW! Just sketch your problem briefly and you shall have a money-saving plan submitted you at once.

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Do YOU Use a Power Drag Scraper?

LE CLAIR POWER DRAG SCRAPER
Top and bottom alike—when one side is worn it can be reversed—double length of service.

I have been telling the readers of Rock Products for some time that I am putting out the best Power Scraper on the market and that I wanted to hear from all those who are already users of Power Scrapers. Those who have written me have learned of a positive way to save money and get the greatest possible amount of work done—and it didn't cost them a cent to find out.

Now, why not let me hear from you? Here's my offer:

Send me the size and horsepower of your hoist and the capacity of the scraper you are now using and I will send you a LE CLAIR POWER DRAG SCRAPER on trial. You can use it for ten days and then return it at my expense or mail check to pay for it. I have to limit this offer to about six at a time. Write me today and get on the next list. It will be to your advantage to do this.

L. P. GREEN

907 Lumber Exchange Building, Chicago, Illinois

"Hercules Solid Weld" Steam Shovel Chains

Best In the World. Will Actually Wear Out

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FULL CIRCLE CRANES. "EQUIPMENT THAT LASTS." TIMBER & STEEL DERRICKS.

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

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WHEN in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

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The Nation's Business Magazine of the Rock Products Industry

542 South Dearborn Street
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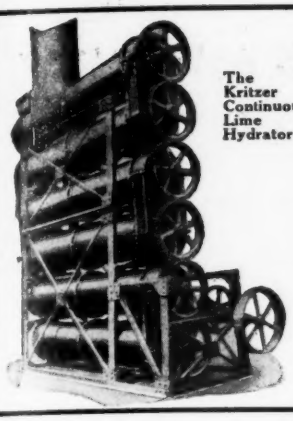

The Kritzer Continuous Lime Hydrator

Hydrating Lime

97% of Hydrated Lime is made either by the Old or by the New Kritzer Process. We Guarantee to manufacture the Best Product at the Lowest Possible Cost. Our engineers have worked out every practical improvement in use today in hydrating lime.

It is our business to solve your problems.
It is our business to investigate thoroughly the conditions that prevail at every plant, to work out all the details and to build a plant that will prove a success from the start.

We assume the Responsibility. Now is the time for you to act. Take the matter up with us NOW and we will outline your whole proposition for you.

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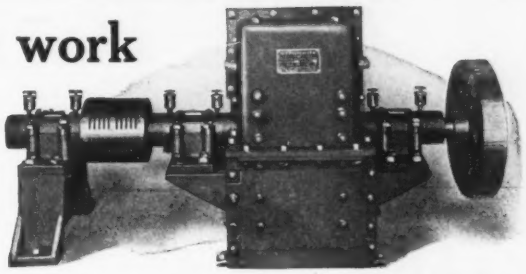
503 South Jefferson Street **CHICAGO, ILL.**

By the very nature of the work

it is called upon to perform a pulverizer must be much stronger than the material it handles.



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"K-B" is built ALL-Steel

Catalog with full particulars on request

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K-B PULVERIZER

Note These Please!

Points of superior merit guarantee economical operation of the Fuller Lehigh

Pulverizer Mill

They are unequalled for producing

Agricultural Limestone

Reduces lump rock to 20, 40, 60, 80, 100 or 200 mesh. Requires no outside accessory equipment. Requires no overhead shafts, drives or screens. All material discharged from mill is finished product. No inside journals or bearings. No inside lubrication. Uniform feeding system. Constant and free discharge. Low installation cost. Low operating cost. Low lubricating cost. Dustless operation. Built in sizes to meet the requirements of your trade. Grinds rock to meet the specifications of all Agricultural Experiment Stations.

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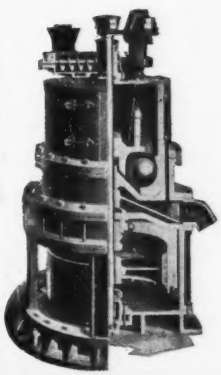

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The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy!
Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

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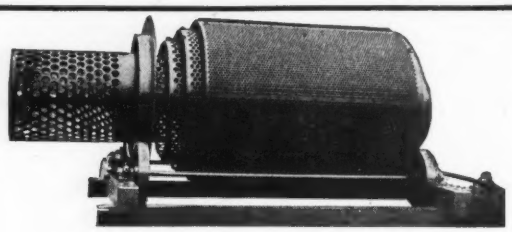
Stone Screen Sections

CYLINDERS
DUST JACKETS

Made to Fit All Makes and Sizes of Revolving Screens



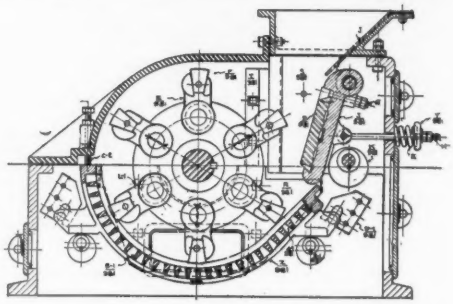
The O'Laughlin Screen (Patented)

Sand and Gravel Screens

CYLINDERS SCREEN PLATES
CONICAL SCREENS
EVERYTHING IN SCREENS
QUICK SHIPMENTS

Johnston & Chapman Co. 2921 Carroll Ave. CHICAGO

THE KENNEDY
Swing-Hammer Pulverizer



A Mechanically Perfect Device

The Kennedy Swing-Hammer Pulverizer embodies mechanical improvements heretofore considered unattainable. Reversible, renewable hammer tips and breaker plates of alloy steel. Impact pulverizing—no grinding movement. Adjustable steel grid—so controlled as to permit adjustment while machine is running. Automatic lubrication. Ball and socket bearings—in short, every possible improvement tending toward efficiency, durability and low maintenance expense.

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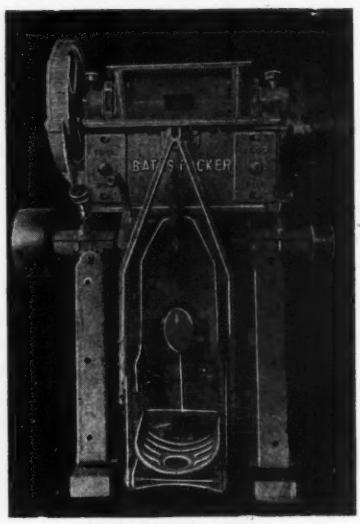
BATES
BAG FILLING MACHINE



SINGLE TUBE MODEL

will reduce your costs in filling bags with pulverized limestone, ground phosphate, gypsum, stucco, cement, Fuller's earth, paint fillers and other pulverized rock products.

Outstanding features of BATES Bag Filling Machines are:

Less Labor
Greater Output
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Made in four sizes—single tube, two tube, three tube and four tube—respective capacities are 75, 150, 225 and 300 ton per day.

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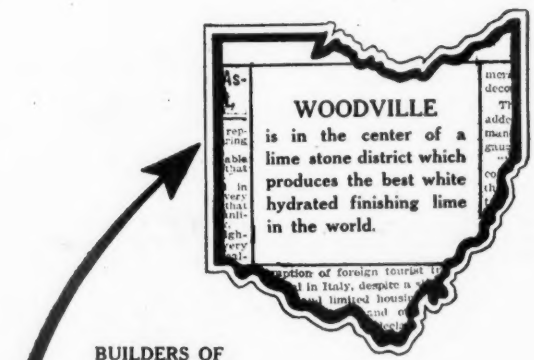

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GEAR AND FRICTION DRIVEN GASOLINE LOCOMOTIVES—2½ TO 25 TONS ON DRIVE WHEEL

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IT WILL PAY YOU TO GET OUR PROPOSITION BEFORE YOU BUY

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STORAGE BATTERY LOCOMOTIVES—1 TO 8 TONS ON DRIVE WHEELS

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PERFORATED STEEL SCREENS

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Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge, and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

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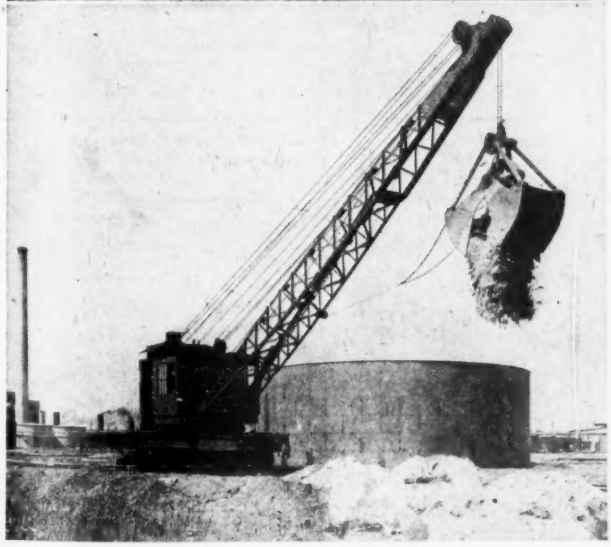
CLAM SHELL BUCKETS - SHIPBUILDING CRANES
CAR DUMPERS PILE DRIVERS
THE McMYLER INTERSTATE CO.
CLEVELAND OHIO



A CRANE WITH A RECORD FOR SPEED

A McMyler Interstate Type "B" Crane, equipped with a McMyler Interstate Clam-Shell Bucket, made a record of 13 trips in 3 minutes, swinging at 90° each trip. The speed is important, but the fact that the crane will stand up under continuous service such as this is more important. The first cost of a crane is of little importance if a large percentage of return is insured. Greater speed, consequent greater capacity, together with low maintenance cost, make the Type "B" one of the best "buys" on the market.

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NATIONAL
Screen Separator

The Leading Screen in

Efficiency
Durability
Simplicity
Capacity

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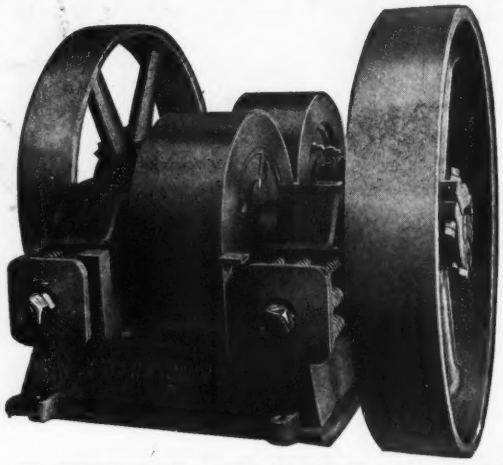

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ELEVATOR BUCKETS, CRUSHERS

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WEBB CITY & CARTERVILLE
FOUNDRY & MACHINE WORKS
WEBB CITY, MISSOURI

Many Notable Improvements Characterize THE "American" Gearless Blast-Hole Drill

While the normal speed of drilling is 50 strokes a minute, this machine will jump the tools smoothly at 60 strokes, handling with ease a 4-in. diameter by 20-ft. length drill stem equipped with bit and socket weighing from 1100 to 1200 lbs. and drilling 5⅜-in. or 6-in. holes.

The spudding beam is attached to the crank in such manner that it gives a quick, hard stroke of drill at a speed of 50 or 60 r. p. m., with a minimum of whipping of cable.

No clutches on the machine; the crank is keyed fast to the crank shaft, and the tools are always the full length of the stroke off the bottom when stopping, permitting them to start on the down stroke with engine or motor at full speed without backing up.

Description on Request

The American Well Works Aurora, Illinois

A Highly Efficient
Building Material Handler
It's a 20-Ton, 8-Wheel

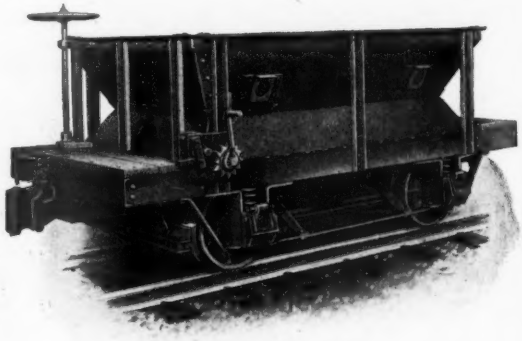
OHIO CRANE

Serving a Concrete Mixer
Owner, Arthur McMullen, New York City

Outstanding characteristics of the Ohio Crane are: Simplicity of design—few parts—cut steel gears—bronze interchangeable bearings—all parts strong and large—ease and speed of operation.

Ask Us to Show You an Ohio at Work

OHIO LOCOMOTIVE CRANE CO.
Poplar Street - - BUCYRUS, OHIO



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We have devoted years to the study of cars for your requirements, and now offer free our engineers' expert judgment in solving your problems.

CARS—every type—that's all we make.

The Watt Mining Car Wheel Co.
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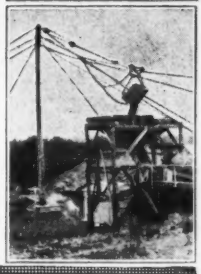
SAUERMAN
DRAGLINE CABLEWAY EXCAVATORS

WHEN deciding on equipment for operating a gravel pit, you will find it profitable to follow the lead of the many successful sand and gravel producers who are using Sauerman Dragline Cableway Excavators.

The cost of installing and operating our type of equipment is moderate, and our small capacity outfits are as economical for the owner of a gravel pit serving a local trade as our larger outfits are for the 1,000-ton per day producer.

If you want to know whether a dragline cableway excavator would be suitable for your particular proposition, give us an idea of your requirements and we will submit our recommendations.



SAUERMAN BROS.
1140 Monadnock Block, Chicago

dig convey elevate & dump in one continuous movement under complete control of one man

Heavy rock work. One of 3 ERIES owned by Sheesley & Janney, Johnstown, Pa.

"Hardest job I've ever had—and best shovel!"

"Nothing but big boulders—it's the hardest job I ever tackled.

"I have worked on practically every make of shovel, and there's not one that can touch the ERIE. It has lots of power. It's the easiest shovel to operate. It stands up fine—fewest repairs."

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Serves either as steam shovel or as locomotive crane, with clam-shell bucket.

The ERIE works steadily in the hardest service. It is built far stronger than the usual standard.

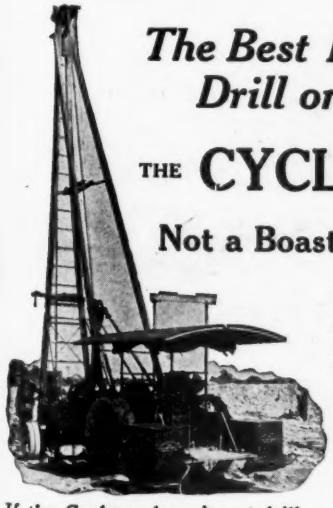
Investigate carefully before you buy. Get the facts—then pick the best steam shovel.

Write for a copy of our Bulletin P.

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Shovels and Cranes; ERIE Ditchers

ERIE Revolving Shovels

BALL Engine Co. Erie, Pa.



The Best Blast-Hole Drill on Earth

THE **CYCLONE** No. 14

Not a Boast—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits in your quarry against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint—it eliminates talking points and evaporates hot air. It puts buying on a strictly engineering basis where it belongs.

Furnished in Steam, Gasoline, Compressed Air or Electric Power Traction or Non-Traction

Let us send you full particulars

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ORRVILLE, OHIO

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Canvas Belting

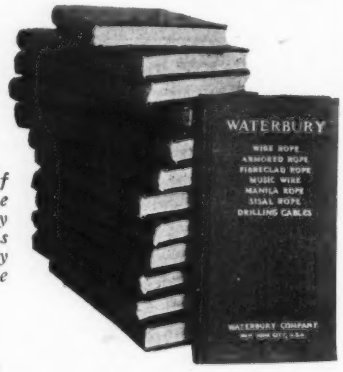
Increase your efficiency and lower your cost by using a "Hettrick" made Belt, "The Belt of Service."

When buying a "Hettrick," you get a quality constructed Belt—you get a Belt made "for service" from high grade selected cotton. Each belt folded by hand and most rigidly inspected, thus insuring less stretch and longer service.

Write for samples and prices

THE HETTRICK MFG. CO., Toledo, Ohio

Waterbury Wire Rope of iron, crucible cast steel, extra crucible cast steel and improved plow steel is made in all lays and standard sizes. Let us help you to select the right rope for your work, so that satisfactory service will be doubly sure. Waterbury quality in every grade is without a superior.



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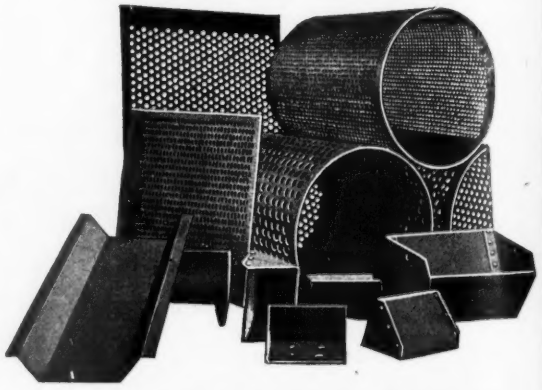
Perforated Metal Screens
FOR
Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS
PLAIN AND PERFORATED
General Sheet and Light Structural Work

Hendrick Mfg. Co.
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New York Office, 30 Church Street

CALDWELL
Belt Conveyors

Simple—Economical

will solve your handling problem. Simple in design, economical of power, they give the utmost satisfaction. Our forty years' experience has made us thoroughly familiar with the many details of construction necessary to success.

A rough sketch showing the conditions to be met at your plant will bring our recommendations. We should also know the capacity desired and the power available.

Get Catalog No. 38

H. W. Caldwell & Son Co.
Elevating, Conveying and Power Transmitting Machinery

Chicago 17th Street and Western Avenue
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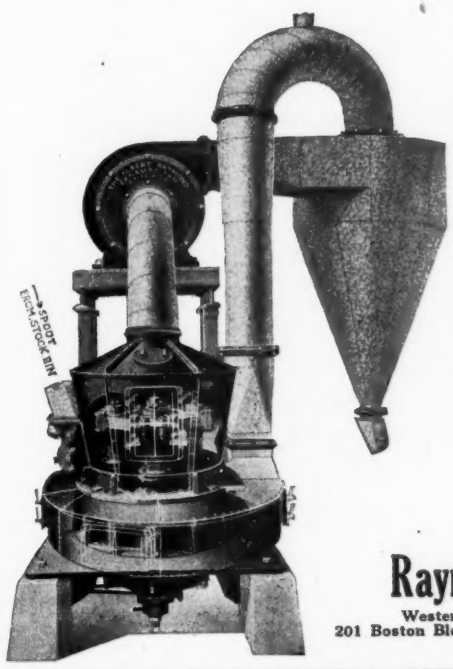
Another cement plant has decided to use Raymond Mills and grind their coal to a fineness of 90 to 92% passing a 200 mesh.



The use of finer coal for burning your cement is well worth your investigation.

Consider a saving of 10 to 15% of your coal at an additional grinding cost of only 25% and we think you can easily see the economy in the finer grinding.

With Raymond Mills you can count on a capacity from each mill of from three to four tons per hour, depending upon grade of coal used, grinding to a fineness of 90 to 92% passing a 200 mesh, which gives a product showing 98 to 99% passing a 100 mesh.

Complete figures will be gladly sent you

Raymond Bros. Impact Pulverizer Company

Western Office:
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1301 North Branch St., Chicago, Ill.

SCHAFFER
Continuous Lime Hydrators

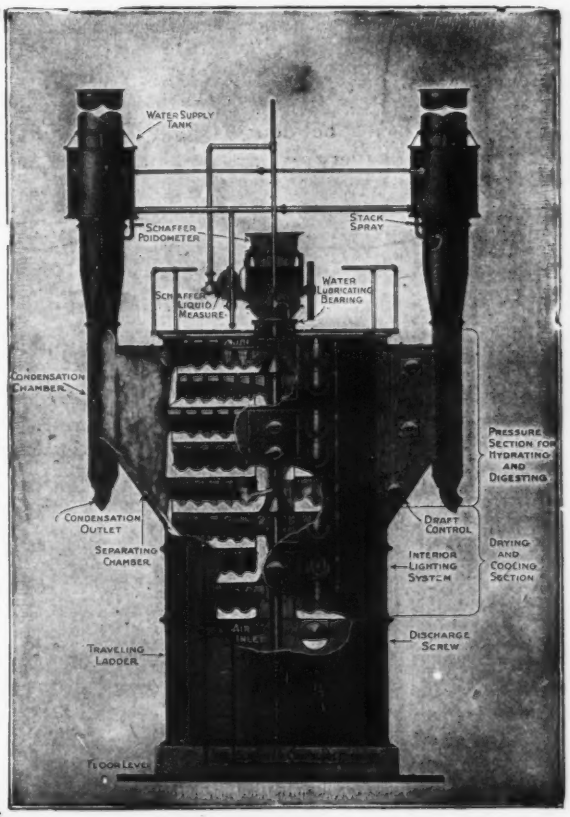
AUTOMATIC operation delivers lime by **weight**, not volume, to the Schaffer Hydrator. Automatically, water, too, is added in correct proportion—insuring a continuous flow of a superior product.

The flexibility of control enables the use of either high calcium or dolomite lime, while at the same time the automatic operation of Schaffer Hydrators solves the labor problem, as they require but little attention.

Our literature on the Schaffer Hydrator covers all the questions you now have in mind. Write for it at once!

Schaffer Engineering & Equipment Co.

Peoples Bank Bldg., PITTSBURGH, PA.

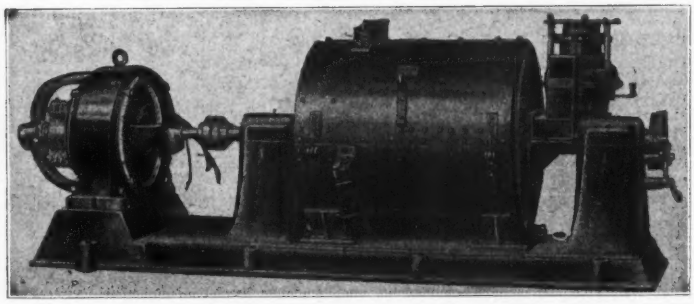


ABSOLUTE SAFETY IN BURNING PULVERIZED COAL

By the Aero System there is no coal pulverized except for instant use. As conditions call for the supply so does the Aero produce the proper quantity. The hazard attendant upon storage of the coal powder is entirely eliminated.

There is nothing between the coal bunker and the furnace except the Aero, its motor and a plain pipe connection. Another feature with the Aero—if the coal supply is sheltered from rain and snow no artificial drying is necessary. Neither must the coal be of a very high grade—low cost slack coal can be made to yield its last B. T. U.

The AERO PULVERIZER



is designed as a complete unit for one furnace. They are built in five standard sizes ranging in capacity from 600 lbs. to 5,000 lbs. of coal per hour. Dust-proof and strongly built. All parts susceptible to wear are easy of access.

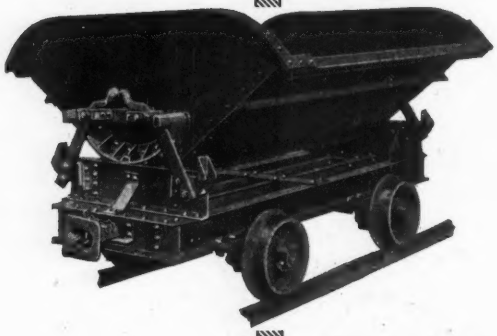
BACKED BY THE LONGEST SUCCESSFUL SERVICE

Write for Bulletin

AERO PULVERIZER CO., 120 BROADWAY, NEW YORK

Koppel All-Steel Quarry Cars

"They seem to wear forever"



Carefully made—properly designed cars that combine lightness with great strength. They are low, easy to load and dump quickly with clean discharge.

This car is one of the many KOPPEL cars suitable for every quarry service.

TRADE MARK REGISTERED KOPPEL U. S. PATENT OFFICE

Your inquiries solicited

Koppel Industrial Car & Equipment Company

Koppel, Penna.

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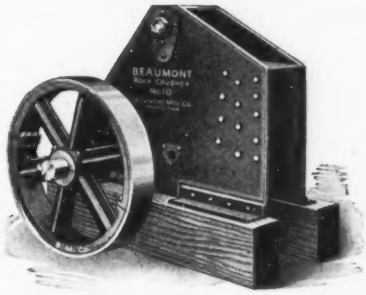
Beaumont Rock Crushers



IMMEDIATE SHIPMENT

No. 10 Crushers—Capacity 16 to 24 Tons Per Hour
No. 12 Crushers—Capacity 25 to 35 Tons Per Hour

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Beaumont Manufacturing Company

CRUSHERS—ELEVATORS—SCREENS 326 Arch Street, Philadelphia, Pa.

Increase Your Production

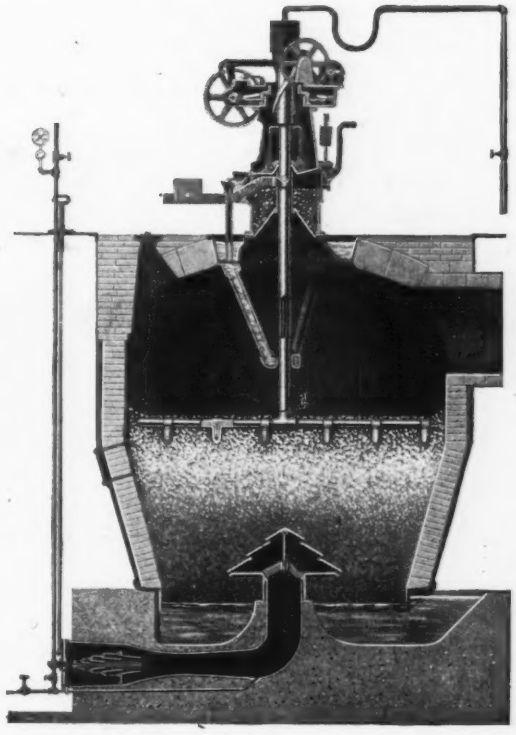
of high grade lime by heating your kilns with producer gas generated in

CHAPMAN Agitator Producers

They deliver a constant supply of high quality gas, thus insuring a uniform temperature in the kiln. This uniform supply of high quality gas burns with a long, clear flame which resembles the flame from a wood fire. The result is a greater production of first grade lime.

The Chapman Floating Agitator will increase the capacity and the efficiency of hand-poked producers already in operation.

Write us for special information



The Chapman Engineering Company

Oliver Bldg. Pittsburgh MT. VERNON, OHIO 11 Broadway New York

NOW COMES THE

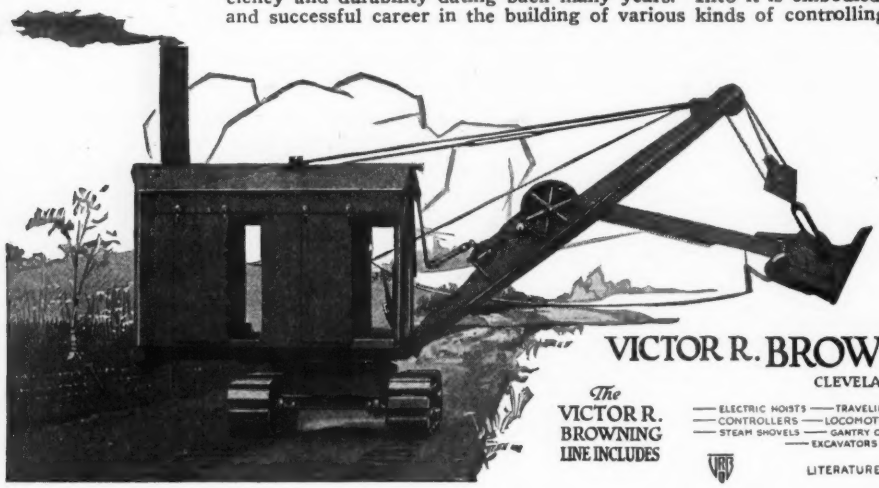
Tank Crawler VRB Steam Shovel

VRB Steam Shovels are now available, mounted on an improved tank crawler truck.

In the war, tanks proved their utility beyond a shadow of doubt.

Likewise, the VRB tank crawler has demonstrated its fitness to operate in places and under soil conditions that would put an ordinary steam shovel entirely out of commission.

As regards the power plant and control mechanism, this shovel holds a reputation for uncommon efficiency and durability dating back many years. Into it is embodied the knowledge gained from a long and successful career in the building of various kinds of controlling and material handling machinery.



VRB Shovels are manufactured for either steam or electric operation in 7½ and 10-ton sizes, and dipper capacities of ¾ to 1 yard.

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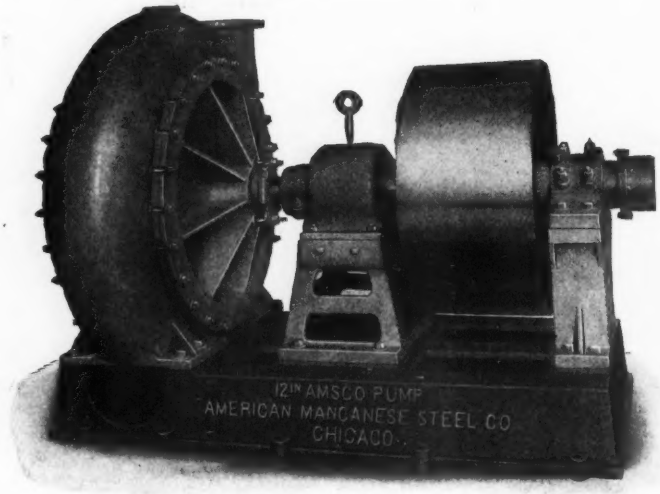

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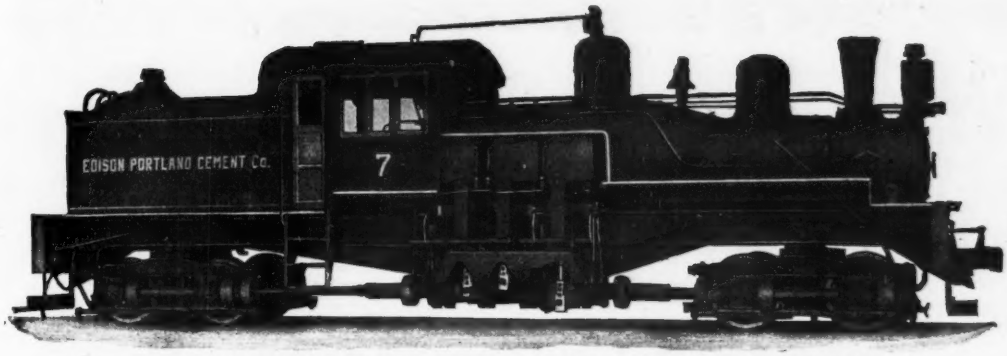

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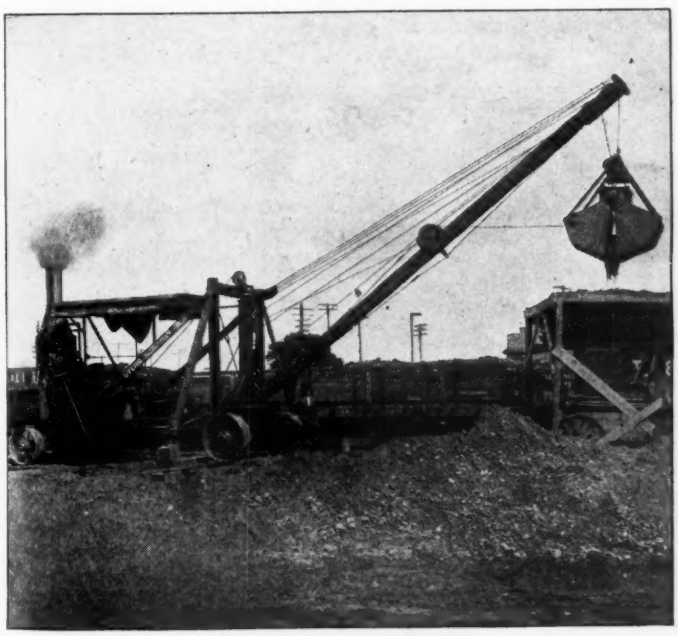

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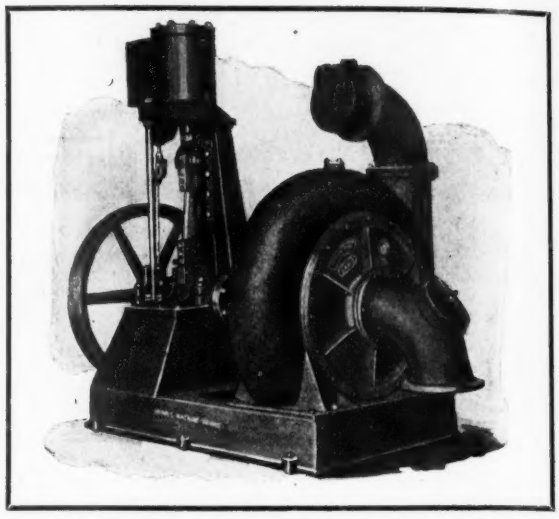

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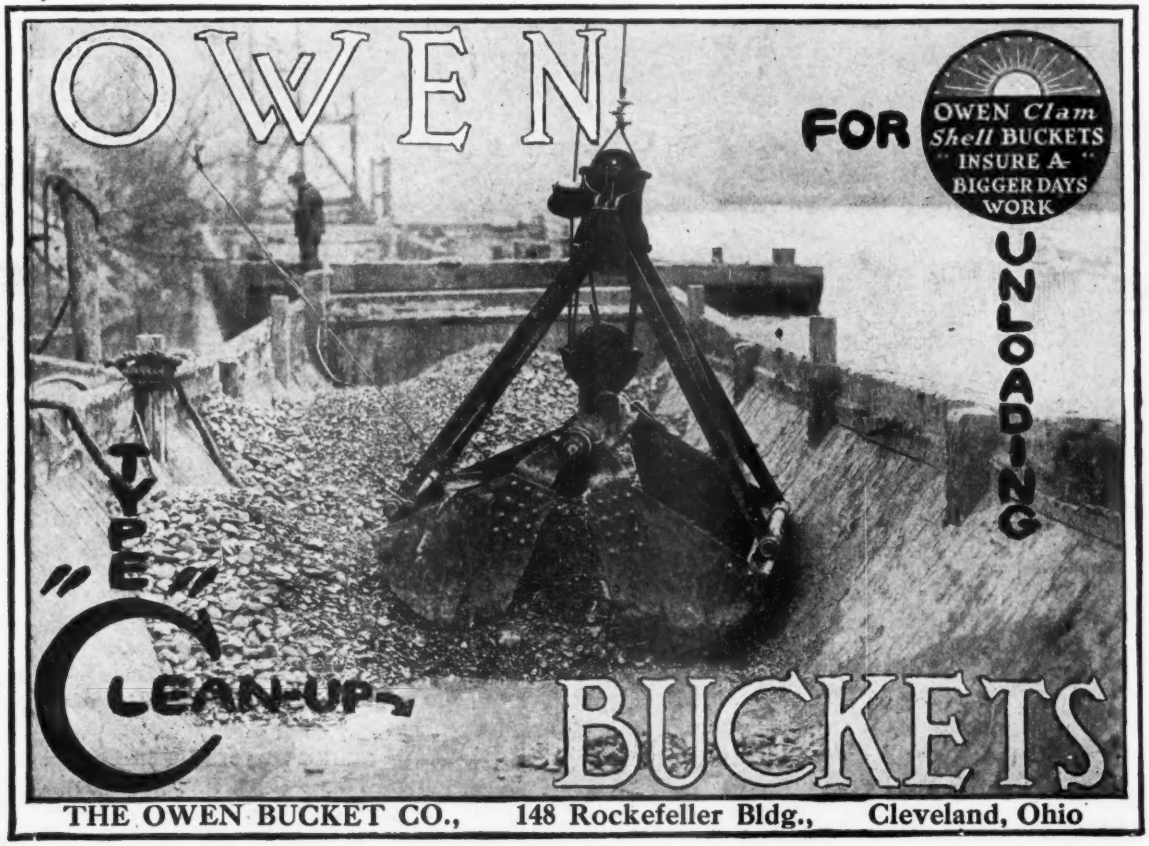

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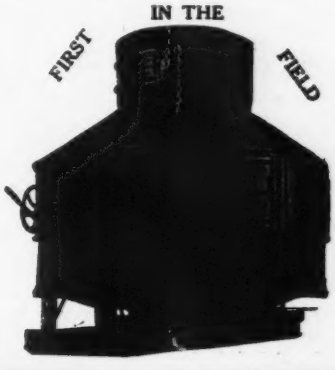

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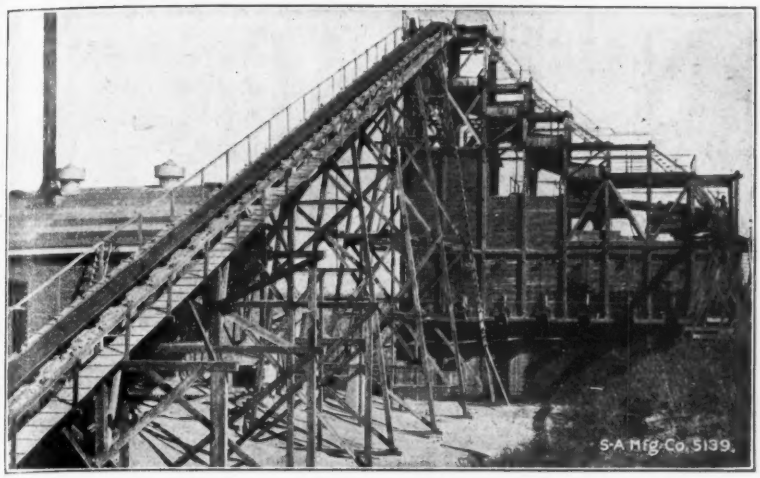

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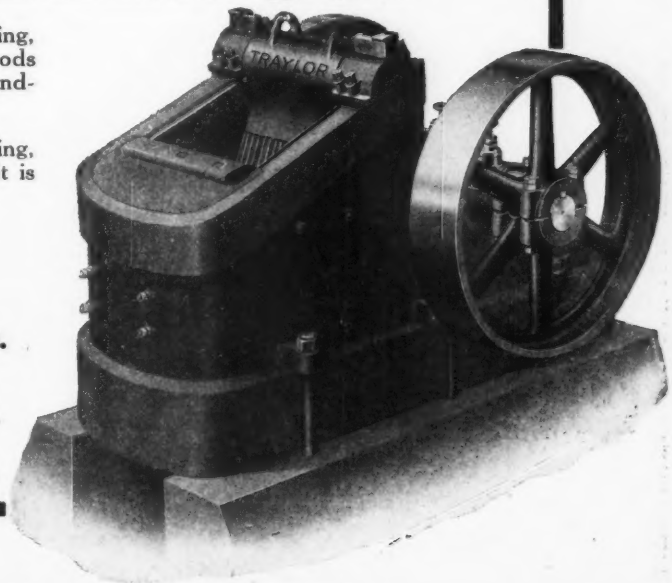

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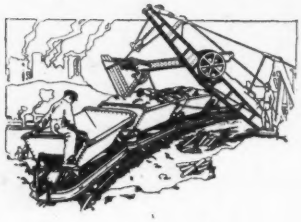

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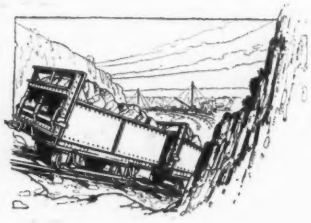

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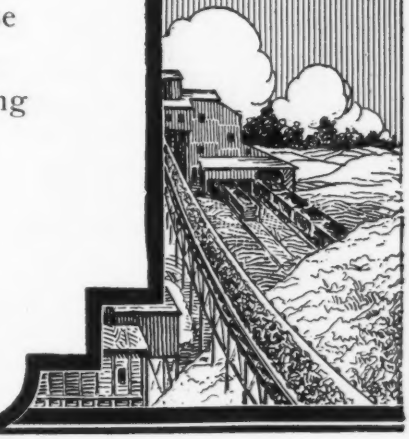
Indestructible White Sheet Packing
Cobbs Piston Packing



Prompt Service on Any Requirement

A practical knowledge of Conveying and Elevating problems forms the basis for the building of belts that meet the severe demands of the Rock Products Industry.

And so on through the list of Rubber Goods, each item a quality product, developed and tested for its particular use.

Conveniently located branches enable our representatives to get in prompt personal touch with your requirements.

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